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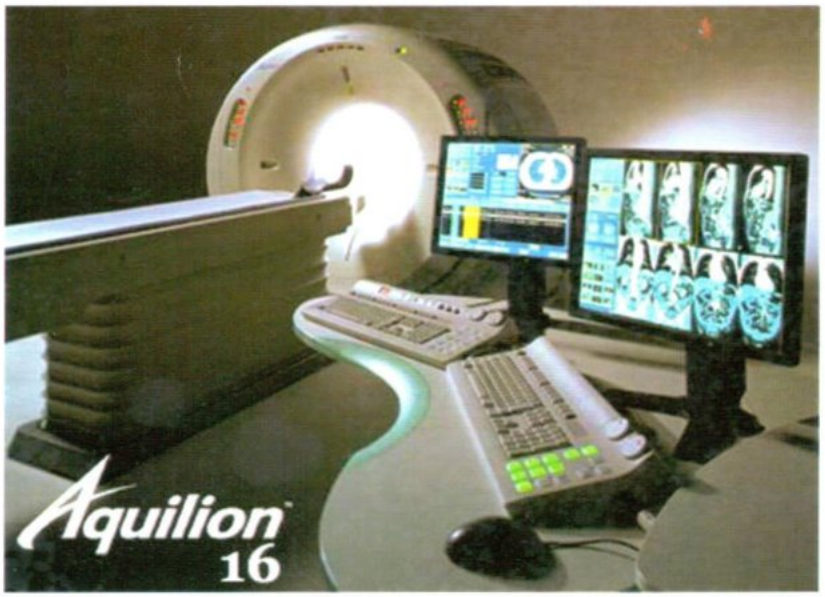

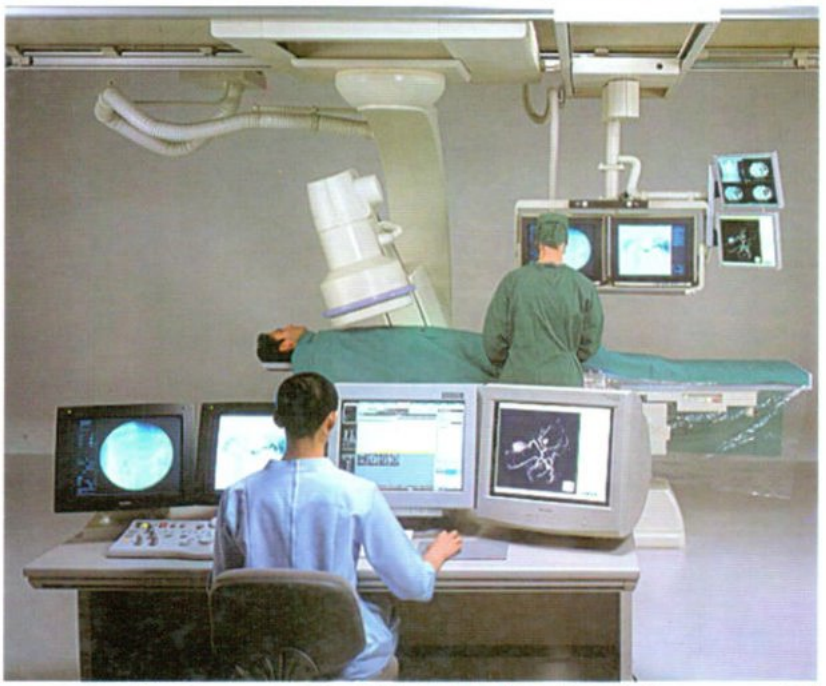

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CONTENTS

MEASUREMENT OF PULMONARY PARENCHYMAL ATTENUATION IN HEALTHY THAI SUBJECTS: USE OF SPIROMETRIC GATING WITH QUANTITATIVE CT.

Ponglada SUBHANNACHART, Sutarat TUNGSAGUNWATTANA, Sumnieng ATHTAWET

ABSTRACT

Objectives: To measure lung attenuation quantitatively in normal healthy Thai people and to measure the attenuation in various areas of the normal lung with quantitative high resolution CT.

Materials and Methods: The subjects in this study were 154 healthy Thai volunteers. High resolution computerized tomography of the lung with spirometric gating (Pulmo CT) were obtained at level of the carina, 5 cm. above and 5 cm. below the carina. Scans were obtained at 50% vital capacity. Overall attenuation of the lungs and attenuation in various areas of the lungs were measured by using automatic fast contour tracing algorithms.

Results: The mean attenuation of the lung parenchyma decreased when age increased. The mean attenuation of total lung parenchyma of healthy Thai subjects was -811 ± 28 HU. The attenuation of anterior and posterior segments of the lung were not statistically different. The attenuation of the central part of the lung was more than in the peripheral part of the lung.

Conclusions: Quantitative high resolution CT or Pulmo CT is non-invasive method for measurement lung tissue attenuation. This method is useful in early detection of diffuse lung lesions and in follow up study.

Keyword: Pulmo CT, Lung Attenuation, Attenuation Values, Quantitative

INTRODUCTION

High resolution CT imaging of the lung parenchyma constitutes a wide-spread clinical application both in diagnosis of diffuse lung lesions and in follow up after treatment.[1] Diagnosis is usually based on a subjective, qualitatives assessment of changes in morphology and density of the lung parenchyma by an experienced radiologist. The problems commonly found are difficulties in the comparison of degree of impairment of the diseases because of different inspiratory level and difficulty in detection of early change or very mild cases of diffuse lung lesions. Factor influence accuracy of radiologist interpretation includes inconstancy of lung inflation.[2] A 10% change in inspirational status resulted on average in a change of about 16 HU of lung

Department of Radiology, Chest Disease Institute, Nonthabury 11000, Thailand

attenuation.[3] Quantitative evaluation of CT images with spirometric gating was developed to overcome this factor.

Quantitative High Resolution CT or Pulmo CT is high resolution computed tomography (HRCT) with constant lung inflation, controlling by spirometry and same mA, KV technique. This method is very useful in 3 major ways. The first way is detection of early change or mild degree of diffuse lung lesions [4] because abnormal attenuation in HRCT could be detected earlier than abnormal pulmonary function and could pointed the most affected area of the lung.[5] This method provides objective quantitative data that reflect changes of pulmonary structures corresponding to lung function impairment.[6,7] The second way is differentiation of diffuse lung lesion into 2 major groups of diseases, the decreased lung attenuation group and the increased lung attenuation group. The third way is to follow up patient's HRCT image and detection of improvement or progression of the lung lesions, comparison with previous study.

Attenuation of the lung in healthy European, using this technique, were reported in many studies but very few in Asian and none in Thai. Very few reports compared lung attenuation in different regions of the lung. It is very important to know normal lung attenuation in healthy Thai people and to know whether the attenuation of lung in different regions are the same or not.

OBJECTIVES

1. To study lung parenchymal attenuation in normal healthy Thai people.
2. To compare lung parenchymal attenuation in different age groups.
3. To compare lung parenchymal attenuation in male and female.
4. To find relationship between vital capacity from spirometry alone and from spirometry gated high resolution computed tomography (Pulmo CT).
5. To compare lung parenchymal attenuation in different lung regions.

MATERIAL AND METHOD

The study was performed in 154 healthy adult Thai volunteers, age between 20-69 years.

41 cases were in age group of 20-29 years, 16 males and 25 females.

47 cases were in age group of 30-39 years, 18 males and 29 females.

34 cases were in age group of 40-49 years, 12 males and 22 females.

19 cases were in age group of 50-59 years, 4 males and 15 females.

13 cases were in age group of 60-69 years, 6 males and 7 females.

The subjects included in this study must reach the following criteria.

1. nonsmoker or smoker not more than 1 pack–year.
2. healthy person who have no history of previous lung diseases or previous thoracic surgery.
3. no chest symptom such as cough, dyspnea, chest pain.
4. had normal chest film performing within the same day.
5. had normal lung function study within the same day. The HRCT studies of the lung were performed using Siemens Somatom plus 40 machine.

Vital capacity from CT scan (CTVC) were measured 3 times in each subject with 3 minutes interval between each time. The highest CTVC was used. The thin section HRCT of the lung were performed with spirometric gating at 50% CTVC.[7,9] (Figure 1) The scan parameters were 1 millimeter slice thickness, 1 second scan time, 275 mA tube current and 137 kV voltage.The patients

were positioned supine on the CT couch and instructed to breath through a small hand-held pocket spirometry connected to a microcomputer (Figure 2). When the 50% CTVC of the subject was reached, the scan was triggered by respiratory gating device and airflow inhibited for the duration of the scan. Three lung levels were examined in each subject, the carinal level, 5 cm. above carina and 5 cm. below carina (Figure 3).

To reduce operator-related reproducibility errors, evaluation of lung parenchyma was based on automatic fast contour tracing algorithms that isolated the left and right lung parenchyma in each HRCT section. The machine automatically rejected extrapulmonary tissue by excluding all pixels outside the range –999 to –350 HU.[10] (Figure 4)

Histogram was determined for the left lung, right lung and both lungs. In the analysis; mean value of lung attenuation and standard deviation were calculated (Figure 5). Lung parenchyma attenuation values were determined by divided lung in anterior-posterior segmentation into 5 segments (Figure 6) and by central-peripheral segmentation into 2 segments (peripheral segment was the lung from subpleural area to 2 cm. distant from the pleura) (Figure 7).

RESULTS

The vital capacity from pulmo CT (CTVC) had linear correlation with vital capacity from spirometry (PFVC). The CTVC is about 0.847 of PFVC (r=0.847).

The mean attenuation of the lung parenchyma related with age in both male and female. ($p<0.05$).

Mean attenuation of the lung decreased (became more negative) when age increased. The mean attenuation of the lung parenchyma in healthy female subject was – 810 ± 29 HU and – 813 ± 25 HU in male which are not statistically different. ($p<0.05$) (Figure 8)

The mean attenuation of the left and right lung were not statistically different ($p<0.05$).

The mean attenuation of total lung parenchyma of healthy Thai volunteers was –811 ± 28 HU (range from –716.4 to –847.3 HU) (Figure 9). The attenuation of the lung parenchyma at carinal level and 5 cm. above caina were –816 and –813 HU respectively which were not statistically different ($p<0.05$). The attenuation at 5 cm. below carinal level is –803 HU which was more (less negative) than in the two upper levels.

When compared between the 5 segments (divided equally from anterior to posterior location) of the lung at each level, the mean attenuation of all segments were not significantly different ($p<0.05$).

The mean attenuation of lung parenchyma of central and peripheral segments were –811.9 ± 34 HU and –832.5 ± 29 HU respectively. The mean attenuation of the central part was more than in the peripheral part of the lung (central part had less negative value) ($p<0.05$).

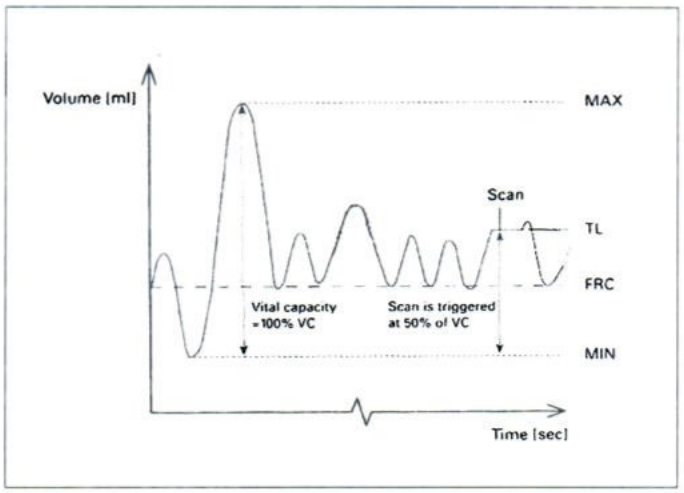


Fig. 1. Example of a breathing curve used to obtain CT scans under respiratory control.

Fig. 2. The spirometer gating device with application in a volunteer study.

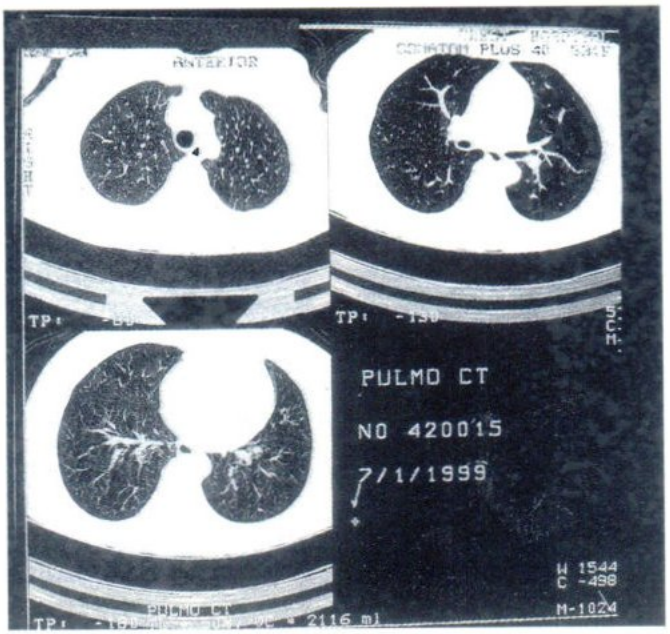
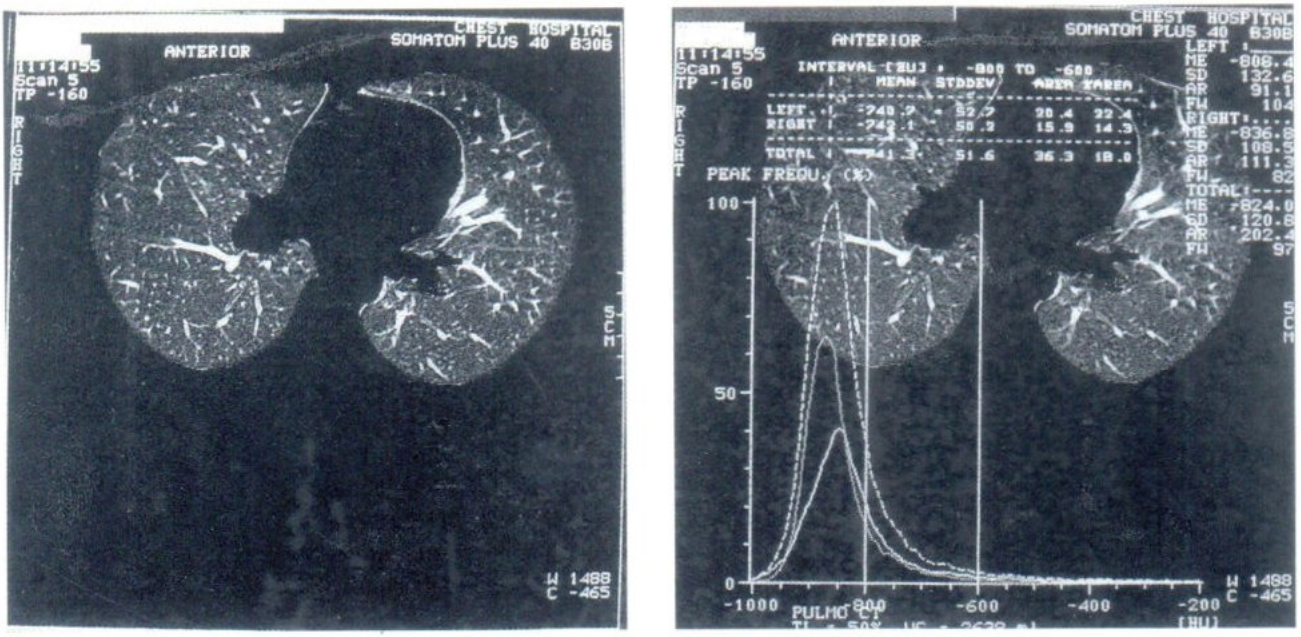


Fig. 3. Three examined lung levels: 5 cm. above carina, carinal level and 5 cm. below carina



A B

Fig. 4. Scan of isolated lung parenchyma and corresponding histograms.
(a) isolated left and right lung parenchyma using automatic fast contour tracing algorithm.
(b) Histograms correspond with the left, right and total lung.

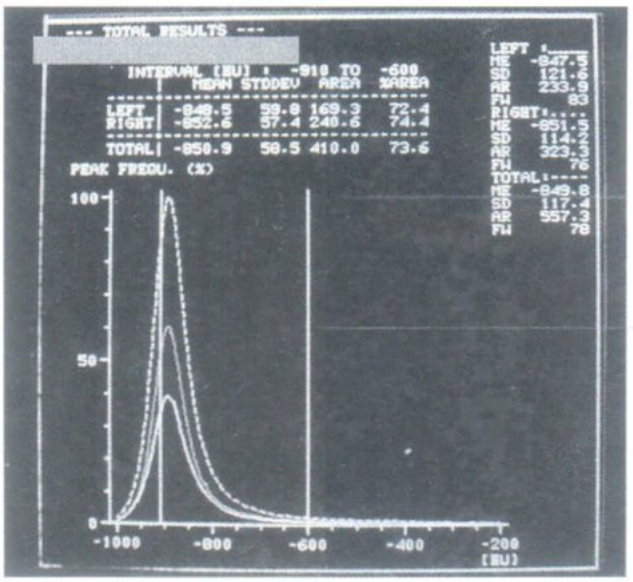


Fig. 5. Histogram and mean attenuation values of the left lung, right lung and both lungs.

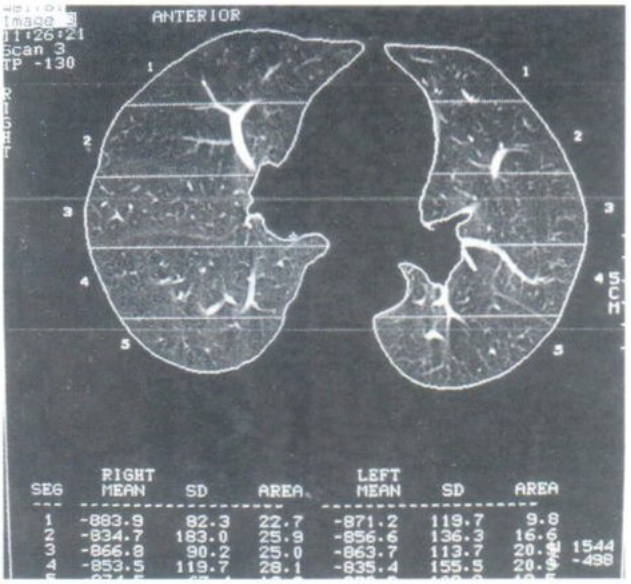
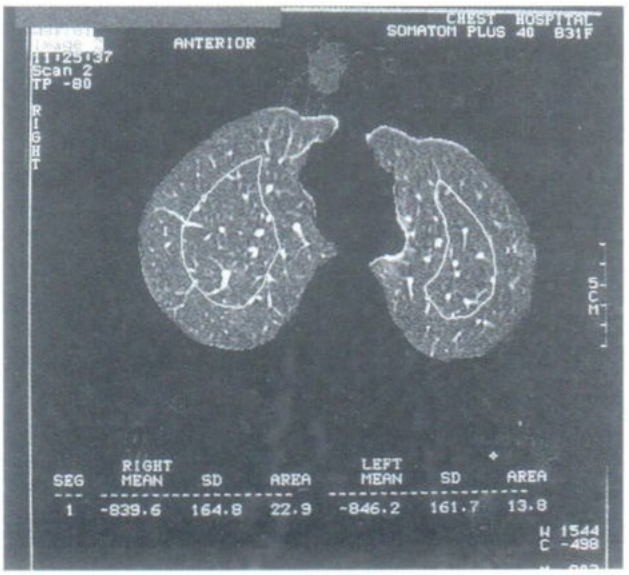


Fig. 6. Lung parenchyma attenuation values of the 5 antero-posterior segments.



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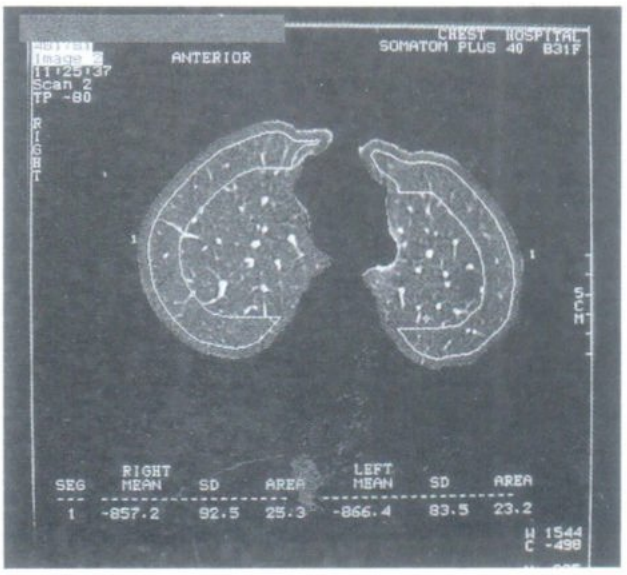

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Fig. 7. Lung parenchyma attenuation values
(a) central segment
(b) peripheral segment

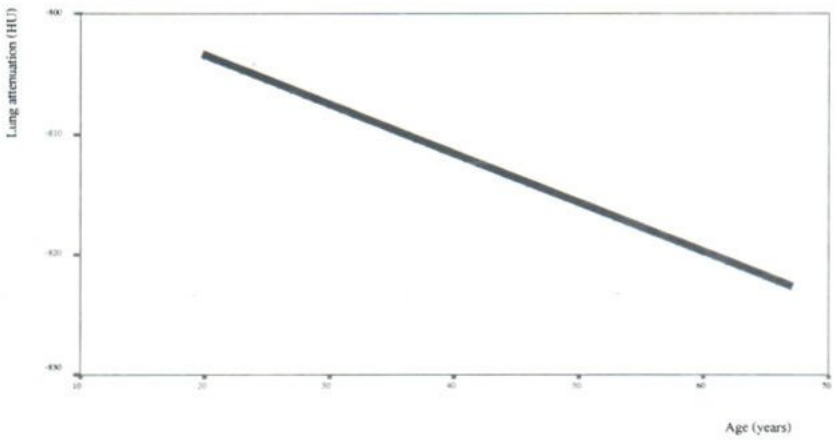

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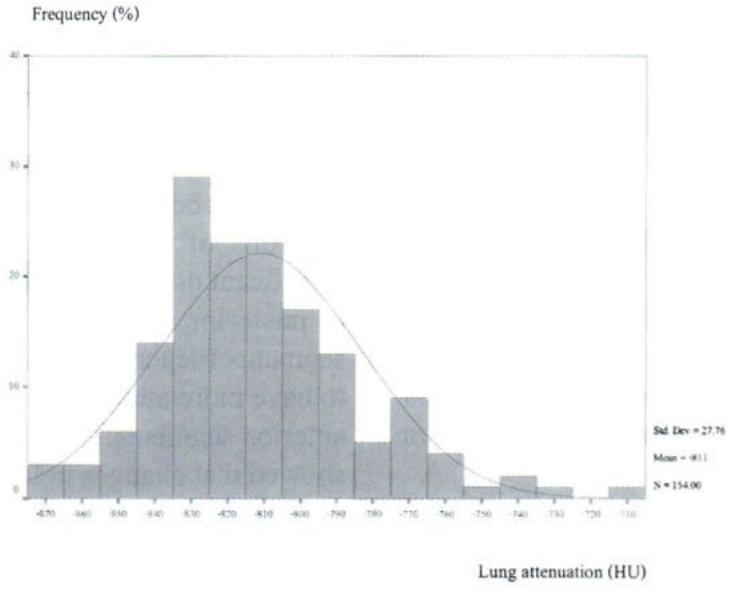
Fig. 8. Reference values for mean lung attenuation and histogram at 50% vital capacity
(a) Lung attenuation decreases as age increases



B

(b) Reference histogram, averaged over all age groups.

DISCUSSION

The mean attenuation of the lung parenchyma in normal healthy Thai subjects is –811 ± 28 HU which is not different between male and female. The mean attenuation of the lung is age-dependent. It will decrease (turn more negative) when age increase. These results are the same as the study of Kalender.[11]

In comparison with other studies, the mean attenuation of lung parenchyma of normal healthy Thai subjects is not different from normal healthy foreigners which are –817 HU,[12] –819 ± 3 HU,[9] –820 ± 4 HU[7] and –829.8 HU[13] (range between –770 to –875).[14] We can use –811 ± 28 HU to be the reference of normal lung attenuation in Thai.

Many studies divided the abnormal attenuation of lung into two major groups.[6] The first is group of decrease lung attenuation such as pulmonary emphysema, air-trapping lung lesion. The other is group of increase lung attenuation such as pulmonary fibrosis, interstitial pneumonia etc.

Some studies used –900 and –910 HU to be the upper value of normal lung (emphysematous index). [5,7,14] Some used –700 HU to be the lower value of normal lung (fibrosis index).[7]

In pulmonary emphysema, expiratory quantitative CT is not as accurate as inspiratory CT for quantifying pulmonary emphysema and probably reflects air trapping more than reduction in the alveolar wall surface.[8]

There is significant linear correlation between the vital capacity from CT (CTVC) and the vital capacity from spirometry (PFVC). CTVC is 0.847 times of PFVC which is the same as the study of Rienmuller [15] ($r=0.84$, $p<0.001$).

CTVC is less than PFVC because the CTVC is performed in supine position. Because of linear correlation between them, we can predict patient VC (PFVC) from pulmo CT. We can also detect area of airway obstruction by detection of air trapping area in expiratory HRCT [16] (air trapping area is area of different attenuation of lung less than 100 HU between full inspiration and full expiration).

The advantage of HRCT with pulmo CT over spirometry is the ability to detect the location of abnormal or pathological area of the lung.

The attenuation of lung parenchyma in right and left lungs and in different lung levels of each lung are not statistically different. By this result, in the follow up study of diffuse lung patient, we can use the average mean attenuation of healthy subject lung as the normal value in comparison with any abnormal lung area of the patient with or without comparison with the mean lung parenchyma of the patient to determine improvement or progression of the lesion.

To determine the difference in lung attenuation between dependent and non-dependent portions of the lung, this study showed no significant difference in the 5 segments (anterior to posterior segments) but the more posterior segments (dependent portion of the lung) seems to have more attenuation (less negative) than the anterior segments. The study of Verschakelen[17] showed that changes in lung volume have effects on change in lung density in dependent and non-dependent parts of the lung.

The gradient decreases as lung volume increases. The gradient was significantly smaller at lung volume of 90% and 50% of VC than at 10% of VC.[17] So if the lesion mostly located at posterior segment of the lung (such as in asbesto-

sis), the pulmo CT done in prone position might give more accurate lung attenuation value.

The attenuation of lung parenchyma is significantly different between central and peripheral part of the lung. Although HRCT is used to determine abnormality of diffuse lung lesion, some lesions have more profusion at central lung portion such as in sarcoidosis, pulmonary emphysema.[18,19] Some have more profusion at periphery of the lung such as in pulmonary fibrosis, interstitial pneumonitis.[19] In these cases we should also interest in both mean lung attenuation and abnormal attenuation in peripheral or central lung segments.

CONCLUSIONS

HRCT and Pulmo CT are non-invasive methods to measure lung tissue attenuation and are useful to determine lung pathology.

HRCT and Pulmo CT are very useful in follow up study to determine progression or regression of diffuse lung lesions after treatment.

HRCT and Pulmo CT are useful for clinician to determine mild cases or early cases of abnormal increased or decreased lung attenuation by comparison lung attenuation in suspected area with mean attenuation of normal healthy subject.

CT is very useful but it is still the high cost machine in Thailand though we should use it with proper indication.

REFERENCES

1. Kalender WA, Rienmuller R, Behr J, et al. Quantitative CT of the lung with spirometrically controlled respiratory status and automated evaluation procedures. In : Fuchs W (Ed.) Advances in CT. Berlin : Springer Verlag, 1990; 85-93.
2. Rienmuller RK, Behr J, Kalender WA, et al. Standardized quantitative high resolution CT in lung diseases. Journal of Computer Assisted Tomography 1991; 15(5): 742-749.
3. Kalender WA, Rienmuller R, Seissler W, et al. Measurement of pulmonary parenchymal attenuation: Use of spirometric gating with quantitative CT. Radiology 1990; 175: 265-268.
4. Pelinkovic D, Lorcher U, Chow KU, et al. Spirometric gated quantitative computed tomography of the lung in healthy smokers and nonsmokers. Invest Radiol 1997: 32(6): 335-343.
5. Gevenois PA, De Vuyst P, Littani M, et al. CT quantification of preliminary emphysema-correlation with pulmonary function tests: preliminary results on 15 patients. In: Felix R, Langr M (Eds.)
6. Advances in CT II, Springer, Berlin Heidelberg New York, 1992; 3-7.
7. Rienmuller R, Behr J, Beinert T, et al. Evaluation of CT histograms determined by spirometrically standardized high resolution CT studies of the lung in man. In: Felix R, Langr M (Eds.) Advances in CT II, Springer, Berlin Heidelberg New York, 1992; 17-24.
8. Beinert T, Behr J, Mehnert F, et al. Quantitative computerized tomography of the lung-respiration controlled diagnosis of diffuse lung diseases. Pneumologie 1995; 49(12) : 678-683.
9. Gevenois PA, De Vuyst P, Sy M, et al. Pulmonary emphysema: quantitative CT during expiration. Radiology 1996; 199(3) : 825-829.
10. Beinert T, Behr J, Mehnert F, et al. Spirometrically controlled quantitative CT for assessing diffuse parenchymal lung disease. J Comput Assist Tomogr 1995; 19(6): 924-931.

11. Guenard H, Diallo M, Laurent F, et al. Lung density and lung mass in emphysema. Chest 1992: 102:198-203.
12. Kalender WA, Fichte H, Bautz W, et al. Reference values for lung density and structure measured by quantitative CT. In: Pokieser H, Lechner G (Eds.) Advances in CT III, Springer-Verlag, Berlin Heidelberg New York, 1994; 290-298.
13. Adam H, Bernard MS, Mc Connochie K. An appraisal of CT pulmonary density mapping in normal subjects. Clin Radiol 1991; 43: 238-242.
14. Reuter M, Holling I, Emde L, et al. Quantitative assessment of lung density by CT in Navy personnel exposed to asbestos. In: Pokieser H, Lechner G (Eds.) Advances in CT III, Springer-Verlag, Berlin Heidelberg New York, 1994; 308-314.
15. Bae KT, Slone RM, Gierada DS, et al. Patients with emphysema: quantitative CT analysis before and after lung volume reduction surgery. Radiology 1997; 203: 705-714.
16. Rienmuller R, Altmann I, Behr J, et al. Spirometrically standardized quantitative high resolution CT of interstitial lung diseases. In: Fuchs W (Ed.) Advances in CT. Berlin: Springer Verlag, 1990; 102-108.
17. Webb WR, Muller NL, Naidich DP. Diseases characterized primarily by cysts and emphysema. In: High-Resolution CT of the Lung. 3 rd ed. Lippincott Williams & Wilkins, 2001: 455.
18. Verschakelen Ja, Van fraeyenhoven L, Laureys G, et al. Differences in CT density between dependent and nondependent portions of the lung: influence of lung volume. AJR 1993; 161: 713-717.
19. Nakano Y, Sakai H, Muro S, et al. Comparison of low attenuation areas on computed tomographic scans between inner and outer segments of the lung in patients with chronic obstructive pulmonary disease: incidence and contribution to lung Function. Thorax 1999; 54(5): 384-389.
20. Webb WR, Muller NL, Naidich DP. High resolution computed tomography findings of lung disease. In: High-Resolution CT of the Lung. 3 rd ed. Lippincott Williams & Wilkins, 2001: 184-185.

QUALITY CONTROL OF DIGITAL MAMMOGRAPHY EQUIPMENT AT KING CHULALONGKORN MEMORIAL HOSPITAL

Kanlayanee THEERAKUL[1], Anchali KRISANACHINDA[2]

ABSTRACT

Mammography equipment has been used to display Thai women's breast image for more than 30 years. The quality control of the equipment performed by technologists was started no longer than 5 years. The program covers the darkroom cleanliness, processor quality control and mammographic phantom imaging. The quality control tests performed by medical physicist is firstly responsible by the government inspector from Department of Medical Sciences, Ministry of Public Health. The visit is upon requested annually to verify the system performance prior to certification. Very few tests had been conducted according to the limited number in human resources, knowledge and test tools. Digital Spot Mammography system was firstly installed in 1995, follow by the Digital Full-Field Mammography System in 1999 at King Chulalongkorn Memorial Hospital. The quality control program followed the manufacture guideline for MQSA and Non-MQSA Facilities was started after the system installation. Two parts from the QC program are prepared for technologists and medical physicists. The first part was performed and the data from June 2002-2003 was collected, analyzed and presented in this report. The objective of this study is to stress the important of image quality, the safety standards, economical criteria of film retake rate as well as the patient dose reduction. The result shows that most data are in the acceptable limit. The system is well maintained by the service engineer under the service contract. The program for medical physicist covers the system performance study, the hardware assessment such as the collimation, the monitor, viewing facilities, the radiation dose measurement and the overall image quality parameters. More test tool and radiation detector are required for the second part. Furthermore, the test should be performed and evaluated by the experienced medical physicist in this field to fulfill the objective.

Keyword: Quality Control, mammographic equipment, image quality

INTRODUCTION

Mammography is the x-ray examination of the breast. Low energy x-ray is used to provide adequate contrast in the image because various tissues of the breast have similar attenuation co-

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efficients.[1,2] In Thailand, the majority of mammographic images are produced using a screen film combination, exposed to x-rays generated at peak voltages in the range of 25 to 30 kV. The first digital mammography equipment, Digital Spot Mammography System, Bennett, was installed and used on 26th October 1995 at the Department of Radiology, King Chulalongkorn Memorial Hospital. In December 1999, Full Field Digital Mammography System was installed at the same department to replace digital spot mammography system. This system was not only first full field digital mammography in Thailand but also in Asia. Followed by the installation of the same model at the mammography center, Siriraj Hospital in the year 2000. The quality control of the mammographic equipment is scarcely performed at very few centers. The major problem is the lack of qualified medical physicist, well trained technologists and the proper training in this facility as well as the lack of test tools. A one-day workshop on quality control of mammography system was arranged at the department with 20 participants from several centers in Thailand. The objective of the workshop is to educate technologists and initiate the quality control program as well as the MQSA (Mammography Quality Standards Acts) in Thailand.

MATERIAL AND METHOD

The Full Field Digital Mammography equipment used in this study is Senographe 2000D (GE Medical Systems Waukesha Wisconsin 53188, USA.) The system is installed at Department of Radiology King Chulalongkorn Memorial Hospital in the year 2001.

Mammography QC phantoms had been used in this study is Inovision/Victoreen Nuclear Associates (100 Voice Road,Carle Place, NY 11514-1593 USA) Model No.76-001 as shown in figure 1.

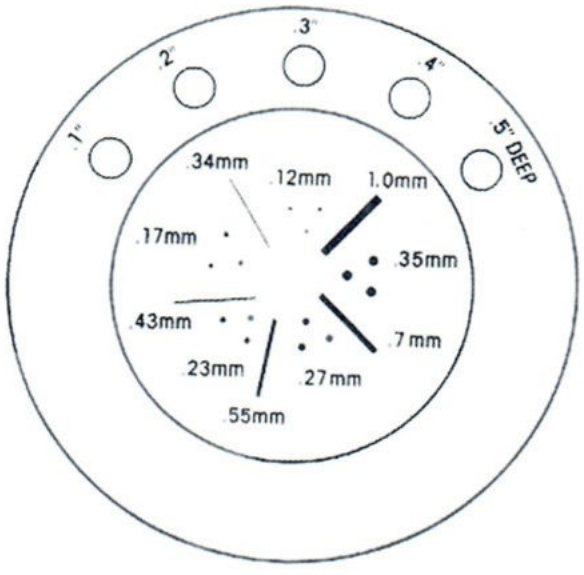

Fig. 1 Mammographic Quality Control phantom

The recommended procedures[3] for conducting Quality Control tests for radiological technologist are shown in Table 1:

Table 1: Quality Control tests and their frequencies as performed by radiological technologist

Test	Frequency
1. Monitor Cleaning	Daily
2. Viewing Conditions Check for the Review Work Station	Daily
3. Flat Field Test	Weekly
4. Image Quality Checks	Weekly
5. Modulation Transfer Function Measurement (Consistency and contrast)	Monthly
6. Automatic Optimization Parameter Mode and SNR Check	Monthly
7. Visual Checklist	Monthly
8. Monitor Calibration Check	Monthly
9. Repeat Analysis Check	Quarterly
10. Compression Force test	Semi-annually
11. Printer Check	Semi-annually

1. Monitor cleaning. The objective is to ensure the good image quality by keeping the monitor screen clean. Dry, soft, lint-free cloth is used for cleaning all monitor screens on the day when clinical image acquisitions or reviews are planned. Check the screen to verify that it is free from dust, fingerprints and other marks then initial in the log book.

2. Viewing conditions check for review workstation. The objective is to ensure optimal viewing conditions. Check the reading room for optimal conditions then initial in the log book.

3. Flat Field Test. This test should be performed before phantom study. Five tests are carried out when flat field test is selected. Those are brightness uniformity, high frequency modulation (HFM), Signal-to-noise-ratio (SNR) uniformity, bad region of interest (ROI) and bad pixel verification. The material used for this test is 19x23 cm acrylic (PMMA) of 2.5cm thickness to cover the entire image receptor. The acrylic must be clean and free from imperfections in order to avoid false results. Use large field of view, remove the compression paddle, Bucky or breast holder. Place the acrylic in the field of view and directly on the image receptor. Select large focal spot, Mo/Mo as target and filter, 26 kV and 200mAs then make two exposures. The results will be processed and displayed. Record all results in the log book.

4. The phantom image quality test. The objective of this test is to check the consistency of the Contrast-to-Noise Ratio (CNR) and to ensure adequate and consistent quality of images acquired by the detector and displayed on the acquisition work station (AWS) monitor, the review work station (RWS) monitor and the printer. As recommended by the American College of Radiology[3] (ACR), the phantom image quality test for screen-film imaging systems includes a test for consistency of image contrast as represented by the density difference between the image of an added test object of 4 mm thick acrylic disk and the background density of the

phantom. In digital imaging the relative level of a signal or contrast to the image noise is the more relevant measure of image quality. Hence, the measure of consistency of Contrast-to-Noise Ratio (CNR) is chosen. The test procedure includes the installation of the grid then position the breast phantom in the field of view of the image receptor. The phantom edge must be flush with the chest wall edge with the 9 cm x 9 cm X-ray field size and use light localizer to center the phantom laterally. Reset collimator to the maximum field of view. Apply 5 daN of compression force to the phantom. Select large focal spot, Mo/Mo target/filter, 26 kVp, 125 mAs, make an exposure.

4.1 Change in Contrast-to Noise Ratio Measurement The measurement should be performed on five consecutive days and use the average as the new CNR01. Select the phantom raw image, set zoom factor to 1, set a window width between 125 and 175. Create a first region of interest (ROI) and position at centered over the large mass of the phantom. Ensure that the ROI is completely within and centered on the image of the largest mass. Create a second ROI with its default size and position it on the background. Record the mean signal in the first ROI as mean_mass , the mean signal in the second ROI, mean_background, the standard deviation of the signal in the second ROI,sd_background. Calculate the CNR as (mean_background-mean_mass) / sd_background. Calculate the change in CNR as 1-(CNR/CNR_{01}) if CNR is smaller than or equal to the CNR_{01}. In the case that CNR is larger than CNR_{01} the change in CNR is (CNR/CNR_{01})-1. The limit of CNR change is less than or equal to 0.2.

4.2 Phantom IQ test on AWS. Process phantom image on the acquisition workstation (AWS) screen, score the objects under optimal viewing conditions. Scores must include deduction of artifacts. Use the zoom, rotation, magnifying glass, brightness and contrast control so that the most accurate score can be obtained. Record the display setting and results.

4.3 Phantom IQ test on RWS. Process phantom image on review workstation (RWS), score the objects under the optimal conditions. Scores must include deduction of artifacts. Use the zoom, rotation, magnifying glass, brightness and contrast control so that the most accurate score can be obtained. Record the display setting and results.

5. Modulation Transfer Function Measurement. The objective of this test is to ensure that the contrast is adequate over the 0-5 lp/mm spatial frequency range by obtaining an estimate of the MTF values near 2 and 4 lp/mm. Resolution bar pattern including spatial frequency groups of 2 ± 0.1 lp/mm and 4 ± 0.1 lp/mm with a thickness of at least 0.1 mm of lead is used in this test. Install the Bucky on the digital detector, the grid must be presented and the compression paddle must be removed. Place the resolution pattern in the field of view on the Bucky. Position the pattern along a direction parallel or perpendicular to the chest wall side. Select the large focal spot, Rh/Rh for target/filter, 30 kV, 28 mAs, left breast lateral. Make an exposure then choose the raw image, set Zoom factor to 1adjust Contrast and brightness for optimum visibility of the test object. Use the ellipse tool for ROI for 2 and 4 lp/mm. Adjust the size of ROI to include as much of the line pair pattern. Record ROI standard deviation,$sd_{2lp/mm}$, $sd_{4lp/mm}$, ROI mean, $mean_{bar}$. Select a ROI of the default size and containing only space material in the pattern of figure 2, record ROI mean, $mean_{space}$.

$$MTF_{2lp/mm} = \frac{sd_{2lp/mm}}{mean_{space} - mean_{bar}} x222$$

$$MTF_{4lp/mm} = \frac{sd_{4lp/mm}}{mean_{space} - mean_{bar}} x222$$

The test is successful if MTF2lp/mm is greater than 58% and MTF4lp/mm is greater than 25%

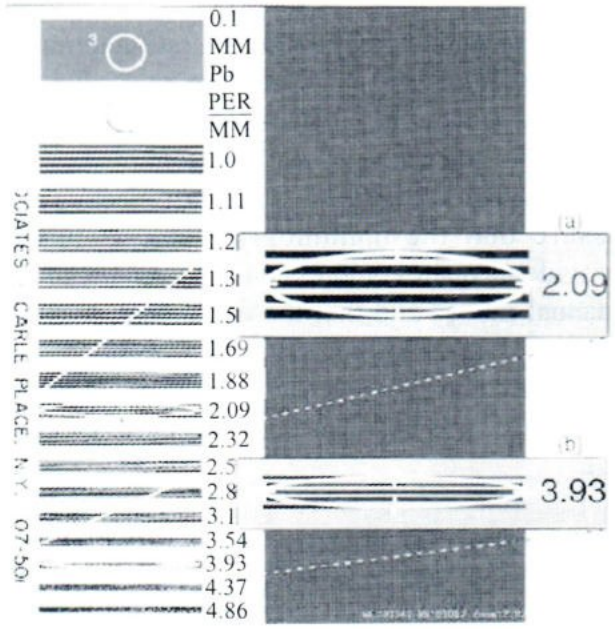

Fig. 2 MTF Measurement

6. Automatic Optimization of Parameters Mode and SNR Check. The objective is to check the correct choice of parameters in AOP mode and the correct level of Signal-to-noise ratio (SNR) in the image.

Set of acrylic plates (PMMA) 20x20 cm size with thickness of 25 ± 0.1 mm, 40 ± 0.1 mm, 60 ± 0.1 mm are used. Begin with 25 mm thick, place the acrylic plate on the Bucky. Align one edge of the plates with the chest wall edge of the detector. Center the plates left-to-right, apply a compression force of 5 daN to the plates. Select Left breast laterally and take an exposure. Record the exposure parameters then repeat these steps for the 40 and 60 mm thickness. Select the raw image for review with the default zoom. Use the ellipse ROI tool to measure the mean value and the standard deviation, s.d., of the image in the region close to the chest wall edge and laterally centered. Calculate the SNR as mean / s.d. The exposure parameters are as in the table 2:

Table 2: Exposure Parameters

Acrylic Thickness (mm)	Target/Filter	Exposure Parameters For AOP STD mode only mAs	kV
25	Mo/Mo	20-60	27
40	Mo/Rh	50-100	28
60	Rh/Rh	50-100	32

The value of SNR must exceed 50.

7. Visual Checklist. The objective is to assure that mammographic X-ray system indicator lights, displays and mechanical locks and detents are working properly and the system mechanically stable. The procedures are reviewed each item on the visual checklist and indicate its status. Initial and date record in the checklist.

8. Monitor Calibration Check. The objective is to assure that the monitor is calibrated and the brightness and contrast settings are at an appropriate level for the reading of mammographic images on the review workstation. The SMPTE (Society of Motion Picture Test Equipment) test pattern is displayed on the RWS. A white square

appears in the middle of the left monitor and an SMPTE pattern appears on the right monitor. At the very top of the left monitor screen is a menu bar. Click on View then Test pattern and SMPTE pattern, a SMPTE patterned will be displayed on both monitors.

8.1 Verify that 0% - 5% contrast is visible.

8.2 Verify that the 95% - 100% contrast is visible.

8.3 Verify that each gray level step from 0% - 100% can be distinguished from the adjacent squares. Verify that the 0% square can be distinguished from 10% square or the 90% square can be distinguished from the 100% square.

8.4 Verify that the alphanumeric characters appear on the pattern are sharp and in focus.

8.5 Verify that the high contrast line pair images at the center and corners of the SMPTE pattern are distinguishable.

9. Repeat Analysis Check. The objective is to determine the number and cause of repeated digital mammograms and to improve the system efficiency as well as reduce digital image retakes and patient exposure.

Identify all exposures which had to be repeated. Record by entering Study number, cause of repeated exposure, date. Estimate the total number of exposures taken during the analysis period. Calculate the overall repeat rate as the total of repeated exposure divided by the total number of exposures during the analysis period multiplied by 100%. Determine the percentage of repeats in each category by dividing the number of repeats in the category by the total number of repeated exposures from all categories. Record all completion of the repeat analysis check in log book. The action must be taken if the total repeat rate or reject rate change from the rate determined for the previous analysis period by more than 2% of the total exposures included in the analysis. The reason for the change must be determined.

10. Compression Force Test. The objective is to assure that the mammographic system can provide adequate compression in power driven and manual modes and that the equipment does not allow too much compression to be applied. The maximum compression force for the initial power driven must be between 11 and 20daN (25 to 45 lb).

11. Printer. The objective is to ensure optimal quality of the film printer output. Follow the QC program developed by the manufacturer of the device.

RESULT

The result of all tests during June 2002 to June 2003 were collected, processed and displayed in this study.

The monitor cleaning and the viewing conditions on the day the mammographic system used had been initial in the checklists.

Flat Field Test. Five weekly tests on acquisition workstation, of 52 week- collection are as the followings:

A. Brightness uniformity. The result shows the range of brightness uniformity from 0.97-4.93 where the mean is 3.20. The maximum limit is 10.00.

B. High Frequency Modulation. The range of high frequency modulation is from 0.49 to 0.8 where the mean is 0.66. The maximum limit is 0.8

C. Bad pixel ranges from 0-6 where the mean is 2.13 and the maximum limit is 100.00.

D. Bad ROI is recorded as 0 and no limit allow in this test.

E. Signal-to-Noise-Ratio (SNR) Uniformity. The range of signal-to-noise-ratio uniformity is from 25.34 to 35.46 where the mean is 33.96 and the maximum limit is 40.00

All five studies are within the acceptable range.

IMAGE QUALITY TEST RESULT

A. The Contrast-to-Noise-Ratio (CNR) Measurement. The result on phantom study is as in the table.3

Table 3 Contrast to noise ratio measurement and the change in CNR

Mean_mass	Mean_background	SD_background	CNR	CNRChange
828.40	780.05	10.73	4.51	0
827.97	779.66	10.57	4.57	0.01
822.62	776.82	10.31	4.44	0.004
822.19	774.93	10.41	4.54	0.007
828.41	779.16	10.37	4.75	0.05

The change in CNR of less than 0.2 shows the system consistency on the image quality of AWS. The important thing is the window width is set at 150 which is within the range between 125-175.

B. Phantom Study. The phantom contains 5 masses, 5 speck groups and 6 fibrils. The visualization of the mass, speck and fibrils show the average of total scores of 13.90 where the lowest score is 13 and the highest is 14. The acceptable range is between 11 and 16. The review workstation displayed better image quality and the average score was 14.15 (14.0-14.5).

Modulation Transfer Function (MTF) Measurement. The average MTF2lp/mm is 73.13 % where the requirement needs the MTF of greater than 58% and the average MTF4lp/mm is 41.51 % where the requirement needs the MTF of greater than 25%.

Automatic Optimization Parameter Check. The result in the checklist is all pass for 25, 40 and 60 mm acrylic thickness. The measurement of SNR is averaged of 84.76, 83.80 and 71.46 for 25, 40 and 60 mm acrylic thickness. The acceptable limit of SNR is greater than 50.

Visual Checklist. The system has been daily checked and initial in the log book for the complete function on indicator lights, displays, mechanical locks and detents.

Monitor Calibration Check. This monthly check on SMPTE test pattern on RW monitor is shown in figure 3.

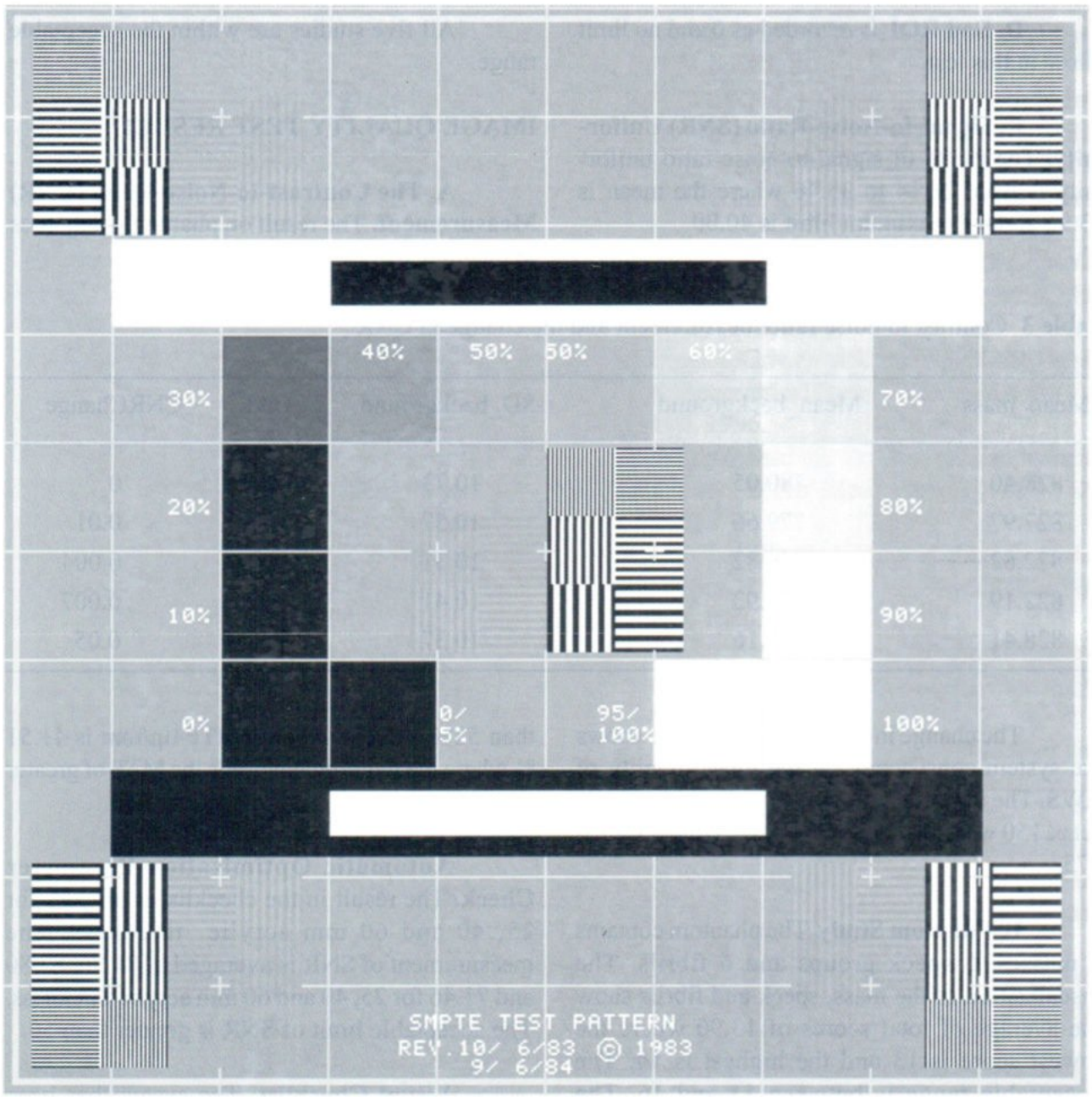

Fig. 3 SMPTE test pattern for the calibration of left and right RW monitors

The following result has been verified such as:

A. 0-5%contrast is visible

B. 95-100% contrast is visible.

C. Each gray level step from 0-100% is distinguished from the adjacent square. 0% square is distinguished from 10% square and 90% square is distinguished from 100% square.

D. All alphanumeric characters are visible.

E. The high contrast line pair images at the corners and the center are visible.

Repeat Analysis Check All repeated exposures that caused the patient to receive additional dose beyond that of the normal study had been collected from July 2002 to June 2003. The result is shown in table 4

Table 4 Repeat Analysis Check

Cause	Number of Repeat Exposure	Percentage of repeat by category
1 Positioning	37	53.6
2 Patient Motion	6	8.7
3 Improper Detector Exposure	12	17.4
4 Incorrect Patient ID	-	-
5 X-ray equipment failure	8	11.5
6 Software failure	6	8.7
7 Blank Image	-	-
Total of Repeat Exposure	69	
Total of All Exposures	22168	
Repeat Exposure Percentage	35%	

Compression Force Test The quarterly check showed the maximum force is not greater than 20 daN and the variation of force at 4-6 daN for normal Thai force is less than 10%

Printer The printer has been calibrated according to the Kodak operating manual and the test pattern is shown in figure 4

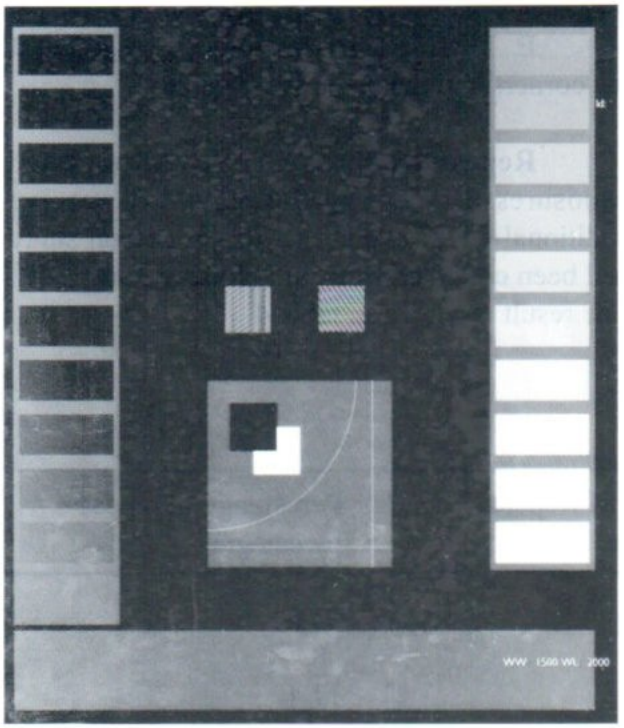

Fig. 4 Kodak test pattern for printer calibration

DISCUSSION

The success of screening-mammography depends on the production of high quality image with optimum patient dose. The result of this study indicates the close watch of the total system parameters concerning the production of the image and the determination of the image quality in the terms of contrast to noise ratio, MTF, the image uniformity and etc. It is very important for the mammographic technologists perform the test consistently as recommended by the manufacture or the international standards. Furthermore, they should keep an eye on the result obtained as well as the careful observation on the mammographic phantom image for the little changes or artifacts on the image. They should rectify the problem immediately or consult the medical physicist or service engineer before using the system in clinical study.

CONCLUSION

This is the pioneer effort to establish the quality control of mammographic system in Thailand. It is well recommended that the quality control program for technologist must be performed regularly and the record must be keeping well in the log book in order to compare the current result to the result on the reference test. Action must be taken after reviewing the result. Quality control of the mammography system for technologist is encouraged to improve the image quality and patient dose reduction as in standards act.

ACKNOWLEDGEMENT

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REFERENCE

1. Johns PC, Yaffe MJ. X-ray characterisation of normal and neoplastic breast tissues. Phys Med Biol 1987:32 ;675-695
2. Ng KH, Muttarak M. Advances in mammography have improved early detection of breast cancer. In publishing
3. GE Medical Systems. QC Manual: Senographe 2000D QAP: Quality Control Tests for Non-MQSA Facilities 2001
4. American College of Radiology. Mammography Quality Control Manual, Reston, VA. American College of Radiology: 1999

THREE-DIMENSIONAL CONFORMAL RADIATION THERAPY FOR PALLIATIVE TREATMENT IN METASTATIC LIVER CANCER : A CASE REPORT

Nantakan **IEUMWANANONTHACHAI**,
Pittayapoom **PATTARANUTAPORN**, Yaowalak **CHANSILPA**

ABSTRACT

A case of metastatic liver cancer from CA colon who failed to systemic therapy was treated with 3D-CRT and periodical irradiation with deep inspiration breath- hold technique. This technique permits the precise delivery of high radiation dose to the target while sparing the most of normal liver tissue. The radiation dose was 66Gy in 20 fraction encompassed the target at the 90 percent isodose line. The tumor was decreased in size and pain was relief. The CEA level was decreased from 1466 to 371 in one month after radiation therapy .The second course of radiation with 30 Gy in 2 weeks was given to the residual tumor. The tumor in the liver was controlled for more than 18 months. The patient could tolerate to the treatment procedure well without any complications inherent to the technique. This technique is an effective and safe treatment for liver metastatic tumor especially in single lesion .

INTRODUCTION

The present of metastases in the liver is usually fatal. Chemotherpy has been accepted to be the treatment of choice. There are documented palliative role of chemotherapy in term of symptomatic relief and slightly increased survival in some study.[1,2] However some type of tumor dose not response to chemotherapeutic agent.So the treatment of patient with liver metastases is principally based on the origin of the primary tumor. Surgery is a well established method on the treatment of liver metastases from colo-rectal cancer. But only a small proportion of these patients will be in a satisfactory condition for surgery.[3,4]

Radiation therapy play a very important role for palliative treatment of metastatic tumours to brain and bones but not for metastatic diseases to liver. The restricted tolerance of the normal liver limits the use of this modality to treat the metastatic diseases to the liver which are usually multiple and occupy the major part of the liver. The radiation doses exceeding 25-30 Gy delivered in 2-3 weeks to the entire liver leading to a fatal complication of hepatitis especially in patient who has poor liver function and minimum liver reserve.[5,6]

The improvement of radiation technique such as stereotactic radiotherapy or three dimensional conformal radiotherapy facilitates treatment by providing a mechanism for conforming the high - dose radiation to the target volume, thus minimizing the dose to adjacent uninvolved normal structures. This process involves graphic reconstruction of 3- dimensional images from multiple cross-sectional CT

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images, beam's-eye-views display, rapid dose calculations and dose display, and the interactive modification of beam parameters to provide adequate target tumor dose coverage and avoid uninvolved normal tissue. However, the movement of intrathoracic and intraabdominal target during treatment still be the major problem for conforming radiation technique. The periodical irradiation with the corresponding of patient's respiratory phase technique for lung metastasis and hepatoma was reported with encouraging response and improving survival.[7,8] Thus, the deep inspiration breath-hold technique is used to treat a case of metastatic liver tumor from colon cancer who failed to chemotherapy and not suitable to surgery.

CASE REPORT

A 69 years old man with a history of CA ascending colon was referred for consultation about role of radiation therapy in metastatic liver cancer. He had a tumor at ascending colon diagnosed in April 1998, and right half colectomy was done there after. The pathological report was well differentiated adenocarcinoma with 2/37 positive lymph node metatstasis.

He received 6 courses of 5FU + Leucovorin as an adjuvant chemotherapy from July 1998 to January 1999. After the treatment, the CEA level was still persisted around 15.

Feb 1999, the CEA level raised to be 23. The abdominal CT was done. Liver and lung metastases were found. The chemotherapy was changed to campto or CPT-11. The treatment was stopped in June due to the progression of disease to be 5x5.5x4.2 cm. and the CEA level was raised to be 206.3.

Oct 1999, the CT scan showed progression of the liver had mass to be 6X6X5.4 cm. and the CEA level had raised to be 591. New combination chemotherapy composed of Oxaliplatin+ 5FU + leucovorin was given. After 3 courses of chemotherapy, the CEA level was 575 while the tumor still progress to be 8x6x5.4 cm.(Figure 1a-1c).The patient was sent to consult for radiation due to pain at the right flank in Feb 2000.The CEA level at that time was 1466. The patient was treated with 3DCRT with the deep inspiration breath-hold technique .

Figure 1a

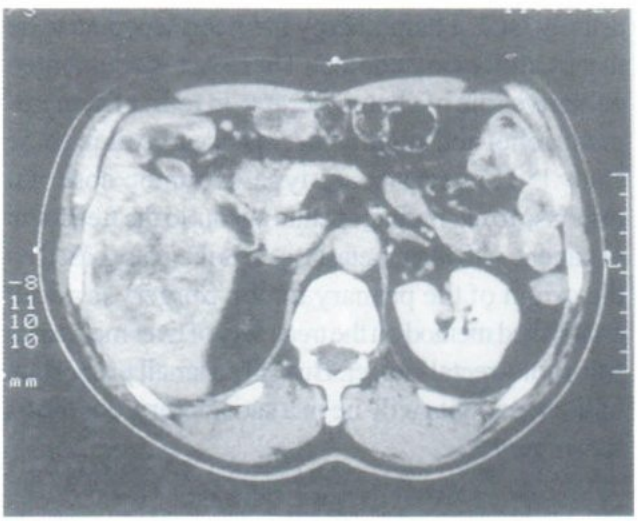

Figure 1b

Figure 1 A-C A large liver mass measuring 8 cm occupied the whole lower portion of right lobe.

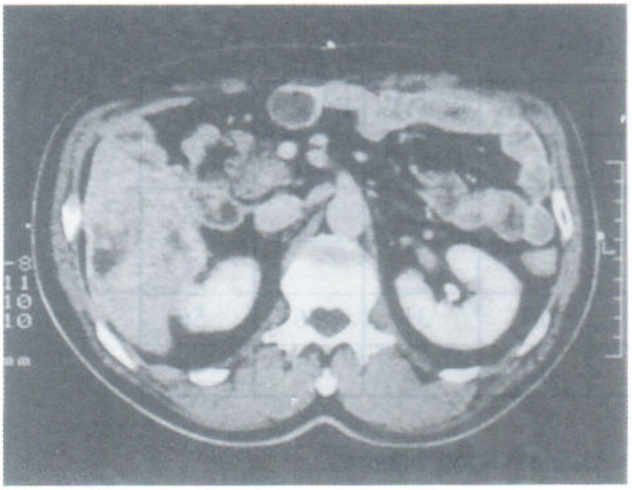

Figure 1c

RADIATION TECHNIQUE

The patient were positioned and immobilized on the CT-scanner couch with the marker wires placed at midline and lateral side of the body along the laser beams. This position was set with these markers through out the treatment couses. Axial CT images, with 0.5 cm slice thickness through the liver were obtained during full inspiration. The CT images were transfered directly to the treatment planning system (Focus 3D-planning system). The processes were done systematically by labeling the external contour to the normal critical organs. Then the treatment volume was defined. In this case we used the gross tumor volume or GTV as the planning treatment volume because it was a palliative treatment. The treatment planning were done according to the shape of the tumor and the critical organs nearby. Multiple static beams of different angles were used. The ninety per cent isodose line was encompassed the target while sparing the most of the liver tissue. After the treatment plan was approved, the alignment was transfer to the central level of the treatment field and CT scan at isocenter slice was done to confirm the same slice as in the treatment plan, while the patient was set in the same position.

To correct the effect of organ movement from breathing, irradiation was given during the period of full inspiration. Thus the treatment had to be divided into small multiple sessions relating to the inspiratory phase. The patient was trained to keep his full inspiration as long as he could and 80 per cent of the duration he could hold his breath would be used for the period of irradiation in each session.

In the treatment room, the patient was set and immobilized by the same position as for the CT scanning. At least two radiation technologists were needed for this treatment procedure. The first one worked on the treatment machine while the other controlled the patient respiration during treatment through the intercom, and observed the patient from the closed-circuit television. According to the biological effect, the 276 cGyX20 fractions which is equivalent to 66 Gy of 200 cGy per fraction, 5 fractions a week by TDF calculation was given.

RESULT

The patient tolerated the treatment procedure very well, no immmediate complication was found. The pain was relief. One month after treatment, the CT scan of upper abdomen was done. The lesion was decreased in size (figure 2a-c) with no reaction outside the tumor. The CEA level was decreased to 371and the liver function test was within normal limit. The CEA level and liver function test were followed up as shown in table 1

Table 1 The CEA and liver profile from Feb to Dec 2000

Date	CEA	Alb	Glob	DB	IDB	SGOT	SGPT	AP
1/2/00	1466	3.9	3.1	0.5	0.1	28	26	76
4/4/00	371	3.9	3.2	0.5	0.1	25	17	75
16/5/00	225							
16/6/00	182	3.9	4.0	0.5	0.1	31	26	56
23/12/00	234	3.9	2.7	0.7	0.3	25	43	58

DB, IDB, AP
DB = Direct Bilirubin , IDB = Indirect , AP = Alkaline Phosphatase

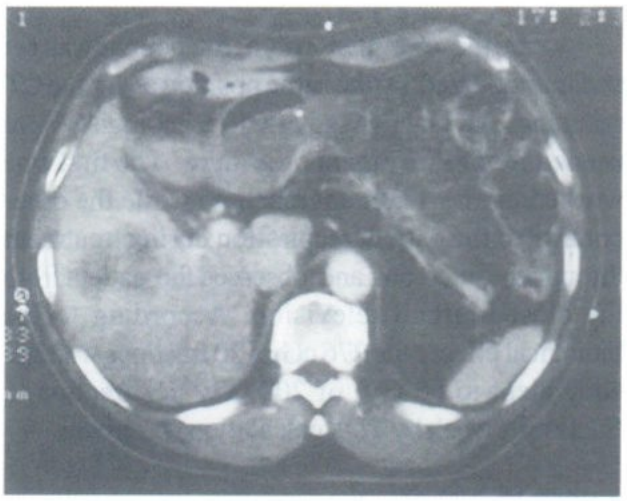

Figure 2a

Figure 2b

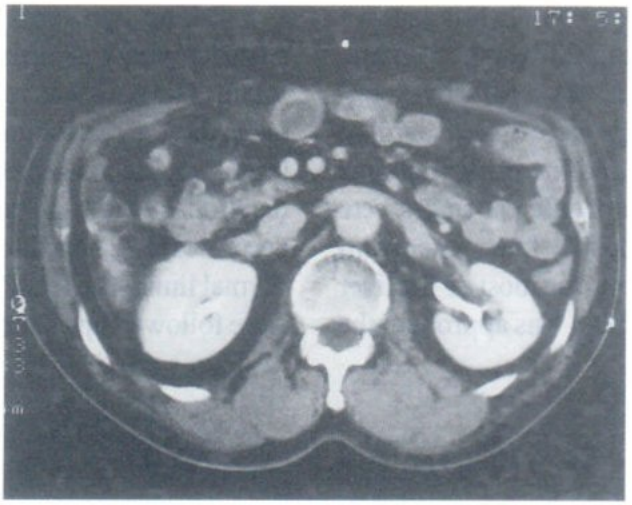

Figure 2c

Figure 2a-c The CT scan showed decreasing in size of the liver in comparison with the lesion before radiation.

In May 2000 , Xeloda that had been claimed to be a very effective drug in colo-rectal cancer, was given to the patient due to the persistence of high CEA level for the purpose of palliative treatment for residual tumor and micrometastasis. But unfortunately the patient suffered from hand foot syndrome after one course of treatment. Because of the CEA level still persisted in July 2000, 3D-CRT was plan to retreat the residual tumor in the liver. Ten fractions of 256 cGy was given to the lesion. At this time we found metastatic lesions in the right lung as in figure 3a. We also treat the metastatic lesions in the right lung lesion by 3DCRT with a radiation dose of 622 cGyx 5 fractions that is equivalent to 70 Gy of conventional dose.

Dec 2000, the lesions in the lung almost disappear (Figure 3b) and also further decreasing in size of the lesion in the liver (Figure 4a-c)

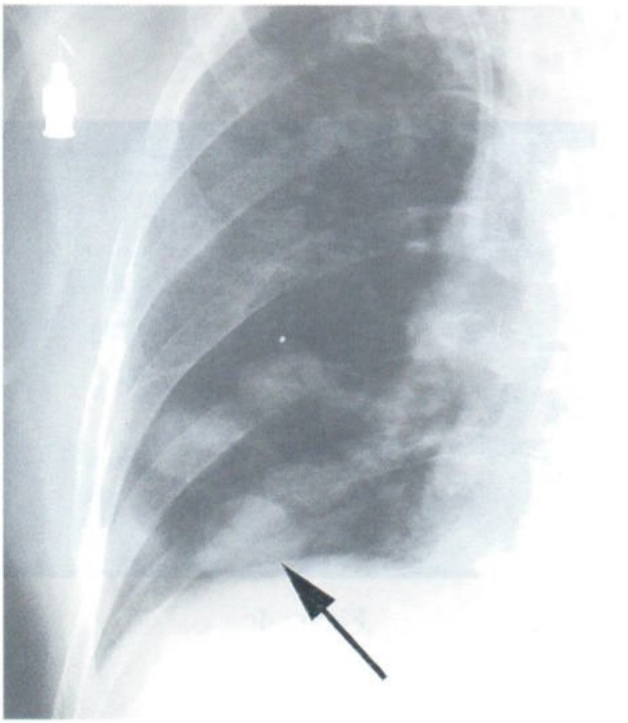

Figure 3a

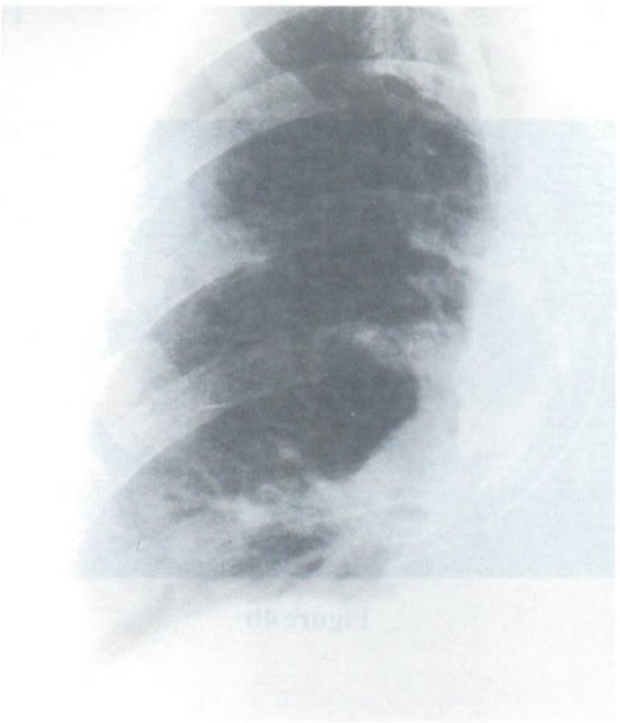

Figure 3a

Figure 3a (left) Chest x-rays showed a large tumor in right lower lobe (arrow) which almost disappeared in **figure 3b (right)** 4 months after 3D-CRT

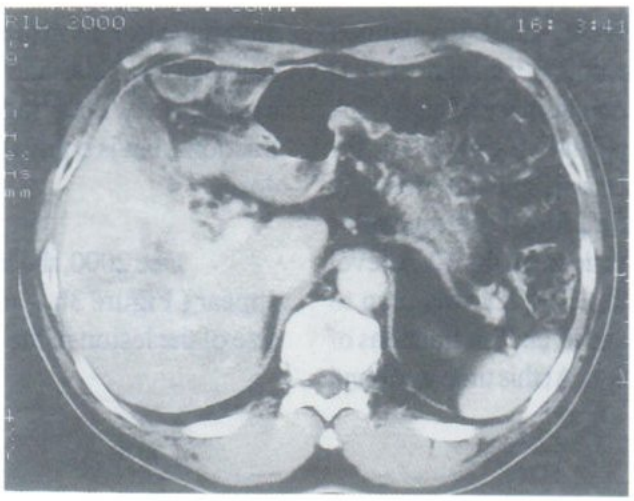

Figure 4a

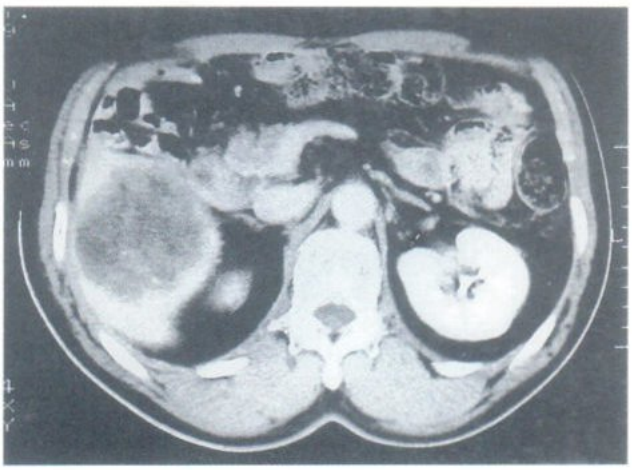

Figure 4b

Figure 4c

Figure 4a-c The CT scan showed mark decreased in size of the tumor in the liver 4 months after 3D-CRT

Jan 2001, there were multiple lung metastasis outside the radiation field. Supportive treatment was given because the patient had no symptom. The CEA level continue to rise up to 1370 in Aug 2001. The patient developed brain metatstasis in Oct 2001. He was treated by conventional 40 Gy to the whole brain and 66 Gy for the metastatic lesion using stereotactic radiation therapy. The patient's clinical condition was well, but the CT scan showed new multiple metastatic lesions in the liver beyond the radiation field as shown in figure 5a-b

DISCUSSION

This patient got the standard adjuvant chemotherapy, 5FU and leucovorin, after surgery for colorectal cancer , but failed to control the disease . The second line chemotherapy regimen

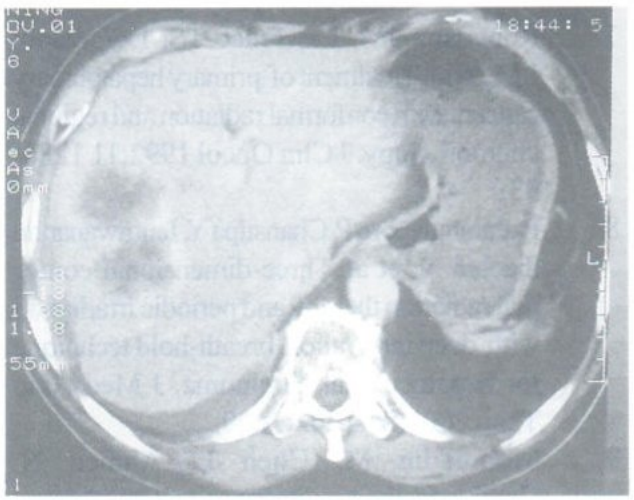

Figure 5a

Figure 5a

Figure 5a-b The abdominal CT scan showed new multple metastatic lesions in the liver beyond the previous radiation fields

with Campto and Oxaliplatin were given. The CEA level and the disease still progressed with pain at the right flank. So the patient was sent to consult for radiation.

Liver irradiation with or without chemotherapy has been used for the palliation of symptom caused by non-resectable hepatic metastatic tumor which had been failed to chemotherapy.[9]

The major concern is that the tumor receives a dose high enough to achieve a reasonable probability of local control while the radiation dose to normal tissue should be kept low enough to an acceptable complication level. Three dimentional computerized planning system provides a mechanism for increasing the tumor dose to the CT-defined target as a mean of enhancing local tumor control and increasing in overall survival.[10-14] One of the most difficult problems in the treatment procedures for these precisely method is the movement of the target organ in the thorax and abdomen. Even if the body can be positioned and immobilized, the visceral organs, such as liver, still move up and down with breathing. The deep breath-hold technique was then developed to solved the problem and showed a good result without any acute complications.[8] This study warrant the high dose, more than 60 Gy , local radiation therapy for metastatic hepatic tumor which was high enough to relieve the pain symptom .The CEA level was dramatic response after stereotactic radiation therapy. The liver profile still in normal limit even after the second course of radiation to the liver in July 2000 showing the successful sparing of normal liver tissue. With the use of active breathing control during treatments, we were able to decrease the amount of normal liver tissue danrage leading to lessen the risk of radiation induced liver abnormality.

However , because of the natural history of the disease , the patient developed brain ,lung and the liver metastases outside the radiation field. The patient survived more than 20 months from the starting of palliative treament for liver metatstases. The patient tolerated the treatment well and also had a good quality of life except during the course of chemotherapy that he felt suffered from the toxicity.

CONCLUSION

Three dimensional conformal radiation and periodical irradiation with the corresponding deep

insipiration breath-hold technique is a simple and feasible irradiation technique for a metastatic liver tumor which is a movable target. The method decrease the toxicity of treatment and therefore, facilitate further dose escalation. This technique should be considered in metastatic liver tumor as:

1. An alternative to open surgery for metastatic liver tumor both in curative and palliative aims.

2. To be used as the booster technique for delivering the high dose to the well defined volume after whole liver irradiation up to maximal liver tolerance dose.

REFERENCES

1. Scheithauer W, Rosen H, Kornek GV, et al. Randomized comparison of combination chemotherapy plus supportive care with supportive care alone in patients with metastatic colorectal cancer. BMJ. 1993;306:752-5.
2. Glimelius B, Hoffman K, Graf W., et al. Quality of life during chemotherapy in symp tomatic patients with advancd colorectal cancer. Cancer.1994;73:556-562
3. Stehlin JS, de Ipolyi PD, Greeff PJ, et al. Treatment of cancer of the liver. Annuals of Surgery.1998;208:23-35.
4. Elias D, Lasser PH, Montrucolli D, Bonvallot S, Spielmann M. Hepatectomy for liver metastasis from breast cancer. Eur J of Surg Oncol.1995;21:510-513.
5. Ingold JA ., Reed GS.,Kaplan HS., Bagshaw MA. Radiation hepatitis. AJR. 1965;93:200 -203.
6. Russel AH., Clyde C., Wasserman TH. Ac celerated hyperfractionated hepatic irradiation in the management of patients with liver metastases results of the RTOG dose escalating protocol. Int J Radiat Oncol Biol Phys. 1993;27-117-123.
7. Robertson JM. Lawrence TS, Dworzanin LM., et al. Treatment of primary hepatobiliary cancers with conformal radiation and regional chemotherapy. J Clin Oncol 1992;11 1286-93.
8. Pattaranutaporn P, Chansilpa Y, Ieumwananon thachai N, et al. Three-dimensional confor mal radiation therapy and periodic irradiation with deep inspiration breath-hold technique for hepatocellular carcinoma. J Med Asso Thai. 2001;84:1692-1699.
9. Mohiuddin M, Chen E, Ahmed N. Combined liver radiation and chemotherapy for palliation of hepatic metastases from colorectal cancer. J of Clin Oncol. 1996 ;14: 722-8
10. Ha CS, Kijewski PK, Langer MP. Gain in target dose from using computer controlled radiation therapy (CCRT) in the treatment of non small cell lung cancer. Int J Radiat Oncol Biol Phys 1993; 26:335-359.
11. Leibel SA. The biologic basis for conformal three-dimensional radiation therapy. Int J Radiat Oncol Biol Phys 1991;21:805-811.
12. Lichter AS. Three-dimensional conformal radiation therapy : A testable hypothesis. Int J Radiat Oncol Biol Phys 1991;21:853-855.
13. Fuks Z, Leibel SA, Wallner KE, et al. The effect of local control on metastatic dissemination in carcinoma of the prostate:Long term results in patients treated with I125 implantation. Int J Radiat Oncol Biol Phys 1991; 21:537-547.
14. Leibel SA, Scott CB, Mohiuddin M,et al. The effect of local-regional control on distant metastatic dissemination in carcinoma of head and neck : Results of an analysis from the RTOG head and neck database. Int J Radiat Oncol Biol Phys 1991;21: 805-811.

PALLIATIVE TREATMENT OF LATE STAGES OF CANCER WITH RADIOTHERAPY AND THAI HERBAL MEDICINE AS SUPPORTIVE REMEDY. (PRIMARY REPORT OF 4 CASES)

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ABSTRACT

Palliative radiotherapy in late stages of cancer in different sites and different pathology using Thai herbal medicine as an adjuvant remedy in 100 cases showing varying degree of synergistic palliative values which will be analysed and reported after a longer period of follow up.

4 cases with a dramatic immediate response are reported in this paper as a primary report.

In advanced cancer cases, palliative radiotherapy alone or in combination with the appropriate combination of chemotherapeutic agents are the available method of treatment with not fully satisfactory results especially in solid tumours. In this report, the 4 cases having been suffering from different radioresistant tumours with generalized distant metastases showed a dramatic response to the combined treatment with partial to complete regression of the tumours not only in the irradiated areas, but also in areas outside the irradiated field. No undesirable side effects and the patients have returned to spend normal life at home.

In advanced cancer, radiotherapy alone or in combination with chemotherpy are the only available methods of treatment. The disadvantage side effects, poor quality of life and the very expensive chemotherpeutic agents are still undesirable for the poor patients.

We are presenting a primary report of 4 cases of advanced cancers from one hundred suffering cancer patients entered in this clinical trial using palliative radiation with herbal tonic batch G716/45 *(Ganoderma Lucidum, Houttuynia cordata Thunb, Boesenbergia rotunda)* as a supportive remedy. The results of treatment reveal partial to complete regression of the tumours, improved quality of life, less side effect than the standard treatment which served as a control result for the trial.

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CASE 1 (T.S)

A Thai man, 56 years old came to the hospital with the chief complaints of severe edema of face,neck,both upper extremities and dyspnea. Physical examination revealed Superior Vena Cava syndrome with masses in the left supraclavicular region. Biopsy of the lymph node revealed metastatic squamous cell carcinoma. Film chest showed superior mediastinal masses with multiple nodules in both lung fields. (Fig 1 A.) Palliative Radiotherapy with a dose of 3000 cGy/3 weeks was given to the superior mediastinum and 4500 cGy/4 weeks at left supraclavicular region. Herbal Tonic batch No G716/45 orally 15 c.c. tid ,pc. was given after radiation therapy.

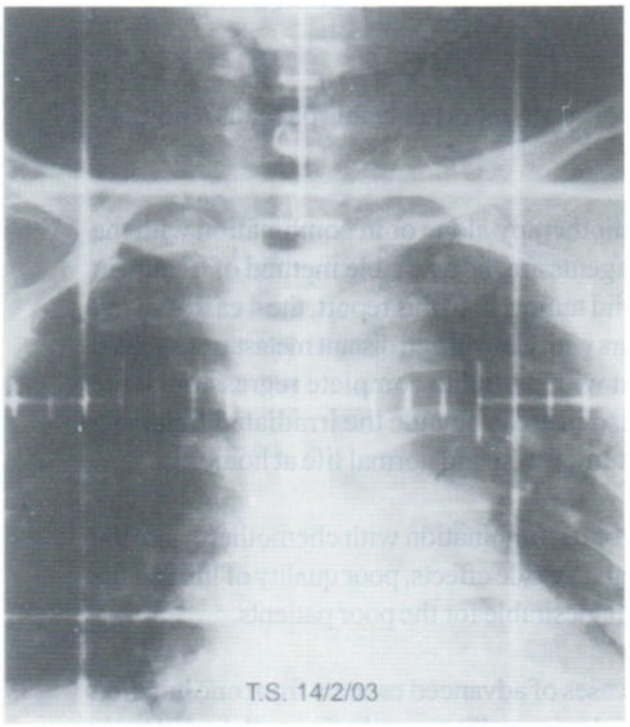


Figure 1A. Port chest film showed anterior mediastinal and both supraclavicular masses with multiple nodules both lungs.(Before treatment)

The result of treatment in this case revealed nearly complete regression of the tumour at the mediastinum as shown in Figure 1 B, 1 C with good quality of life, edema of the face, neck and both upper extremities subsided completely.

The patient returned to work normally in accordance with Karnofsky's performance status 70-80%.

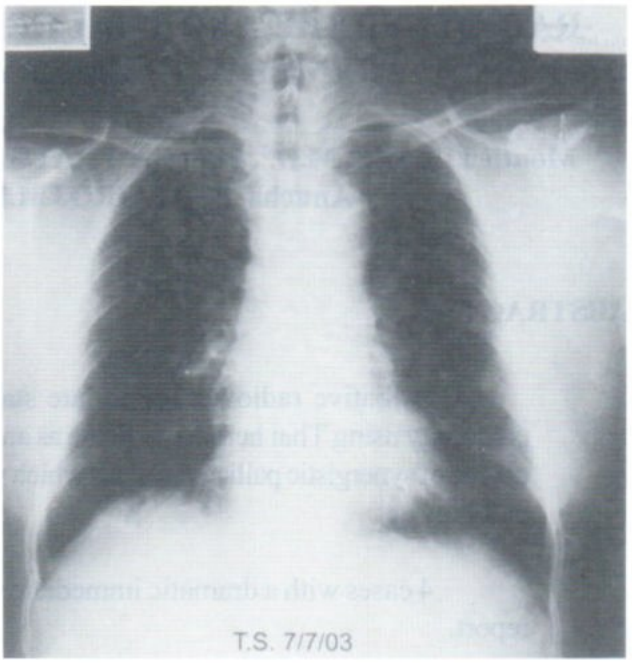


Figure 1 B. (After treatment 4 months)

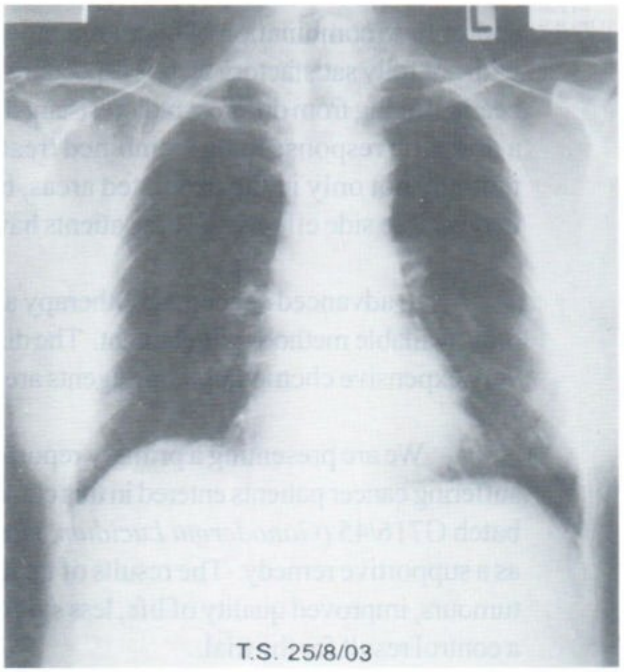


Figure 1 C. (After treatment 6 months)

Figure 1B, 1C : Chest film revealed nearly complete regression of the masses at both supraclavicular and the mediastinum.

CASE 2 (V.V)

A Thai man 42 years old with, a past history of heavy smoking for 20 years, he complaints of chronic cough , dyspnea and chest pain.Percutaneous needle biopsy of tumor mass at right upper lobe revealed adenocarcinona,poorly differentiated. (Figure 2A,2B) Chest film showed a larged tumor mass ,size 8 cmx6 cm. at right upper lobe as shown in Figure 2C.The final diagnosis was non small cell lung cancer (adenocarcinoma,poorly differentiated), stage 3B(T3N2-3Mx) with poor performance status.(Eastern Co-operative Oncology Group 2-3)

Treatment 1. Palliative radiotherapy with linear accelarator (6MV) 4,000 cGy/4 weeks at right upper lobe. 2. Herbal tonic batch No.G716/45 15 c.c.orally tid,pc, after radiation therapy of 3000cGy/3 weeks, had been given.

The result of treatment in this case revealed partial response of tumour size at right upper lobe as shown in Figure 2D ,2E,2F,2G with good quality of life and the patient returned to work in a small private business normally, in accordance with Karnofsky's performance status 70-80%.

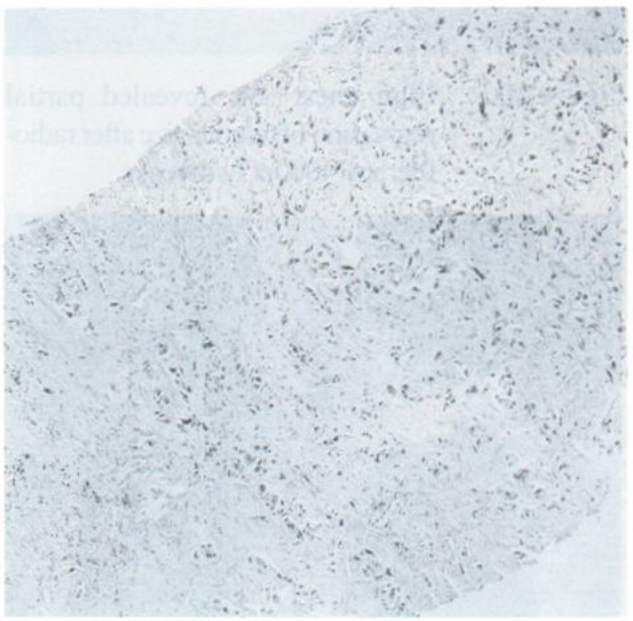


Figure 2A. Microscopic picture revealed a sheet of tissue composed of mainly fibrous tissue and embedded atypical cells in adenocarcinoma, poorly differen tiated. (100x)

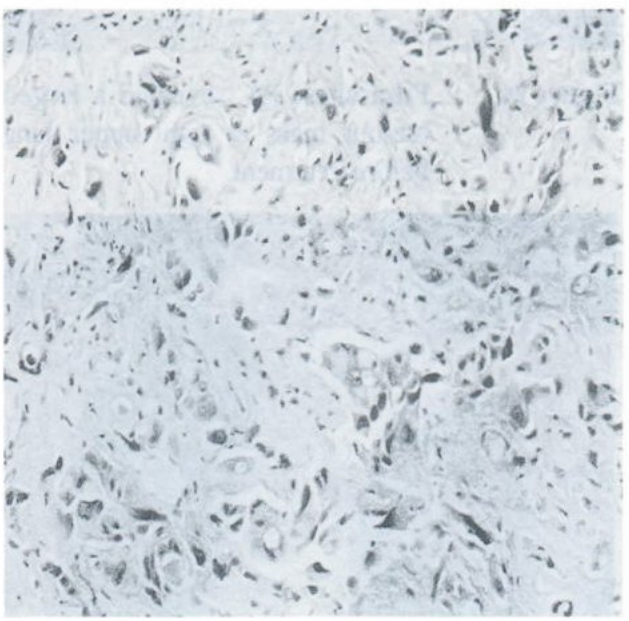


Figure 2B. Tumor cells were pleomorphic. Some of them arranged in gland-like structure. Mucin production was seen, both intracellular and extracellular in the microscopic picture of adenocarcinoma,poorly differentiated. (400x)

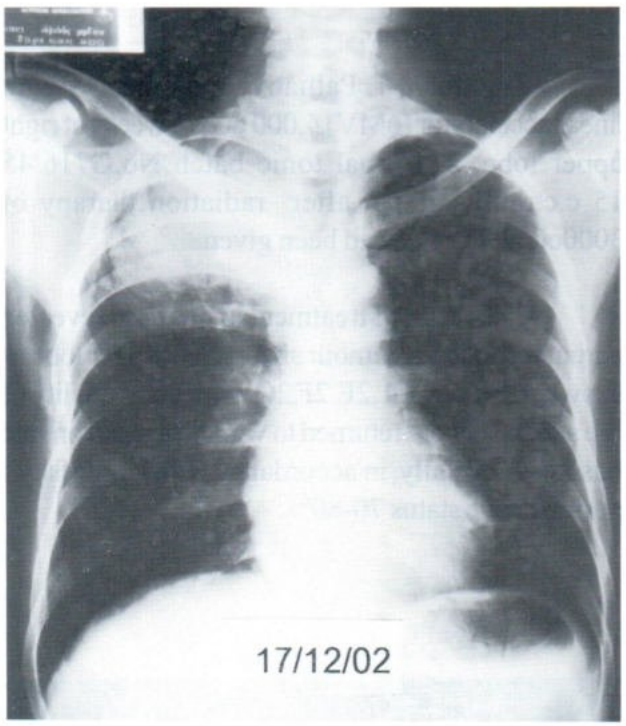


Figure 2C. Film chest PA revealed a larged tumour mass at right upper lung before treatment.

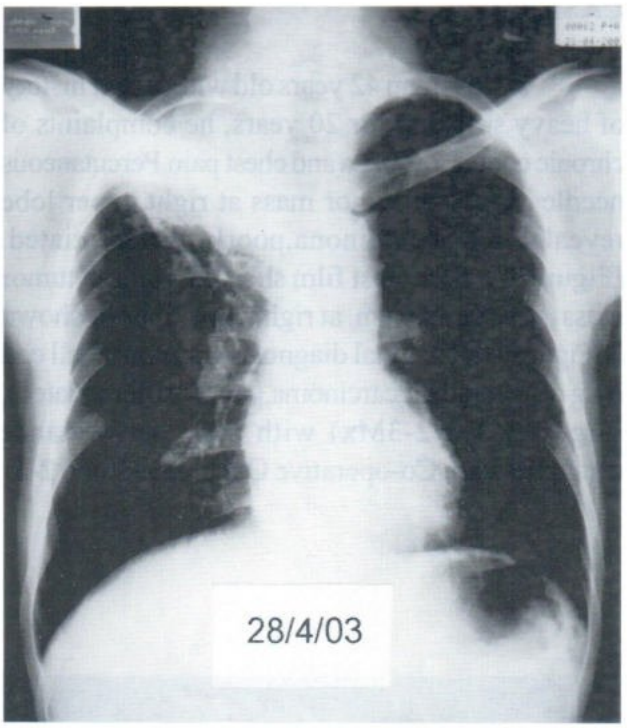


Figure 2D. Film chest PA revealed partial regression of tumour size after radiotherapy 4000cGy/4weeks.

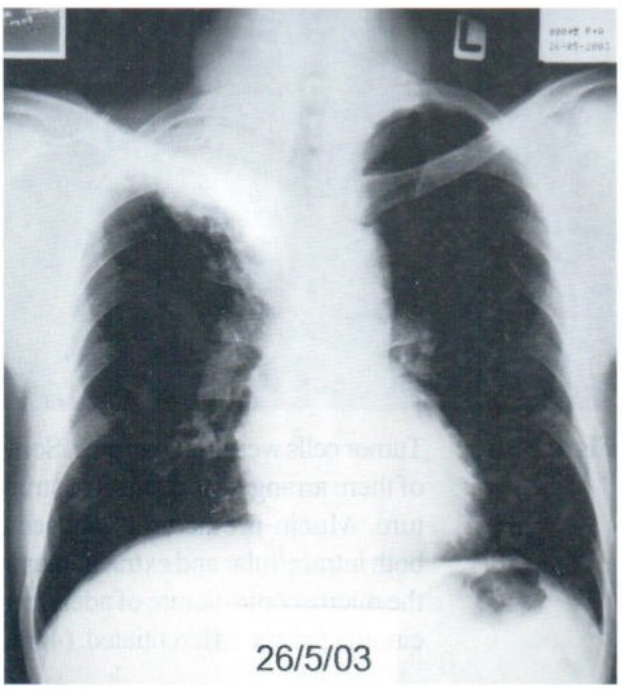


Figure 2E. Film chest PA 1 month later after radiotherapy and herbal medicine revealed partial regression of tumour.

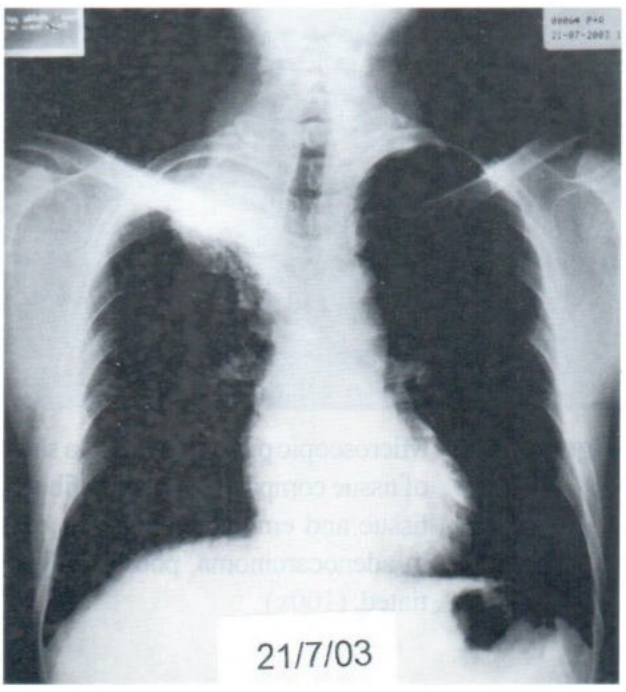


Figure 2F. Film chest PA 3months later after radiotherapy and herbal medicine revealed partial regression of the tumour.

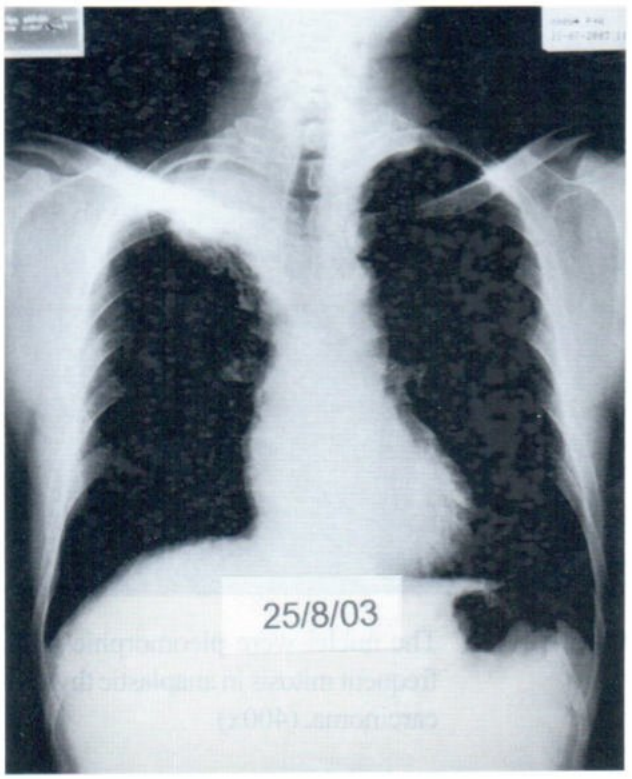


Figure 2G. Film chest PA 4 months later after radiotherapy and herbal medicine revealed partial regression of tumour.

CASE 3 (S.K)

A Thai male 62 years old with complaint of neck mass, hoarseness of voice, dysphagia for 3 months and dyspnea. Physical examination revealed enlargement of both lobes of thyroid gland, more on the left, hard consistency and fixed with underlying tissue. He was referred to Srinagarind hospital with endotracheal tube. Fine needle aspiration revealed anaplastic carcinoma of thyroid (Figure 3A, 3B, 3C). Film chest revealed enlarged neck mass with widening of mediastinum. (Figure 3E). Barium swallowing showed external mass compressing on upper esophagus (Figure 3D)

TREATMENT

1. Emergency tracheostomy 2. Herbal tonic batch No G716/45 15 c.c.orally ,tid,pc and radiotherapy after 3 weeks of herbal treatment. Delayed of radiation treatment was due to a long waiting list in radiotherapy division. 3. Teletherapy tumour dose of 6000 cGy/6 weeks at thyroid and 4000 cGy/4 weeks at the mediastinum.

The result of treatment in this case revealed much improvement immediately 2 weeks after treatment , good quality of life and reduction of thyroid mass was nearly completion as shown in Figure 3F, 3G. No dyspnea, no more hoarseness of voices and swallowing function returned to normal. He returned to work normally in accordance with Karnofsky's performance status 70%.

N.B. Due to inadequate radiation therapy machines in the Radiation Therapy Division of the Department of Radiology, Faculty of Medicine, Khon Kaen, palliative cases have to give the priority for the curable cases and have to be put in a long waiting list.

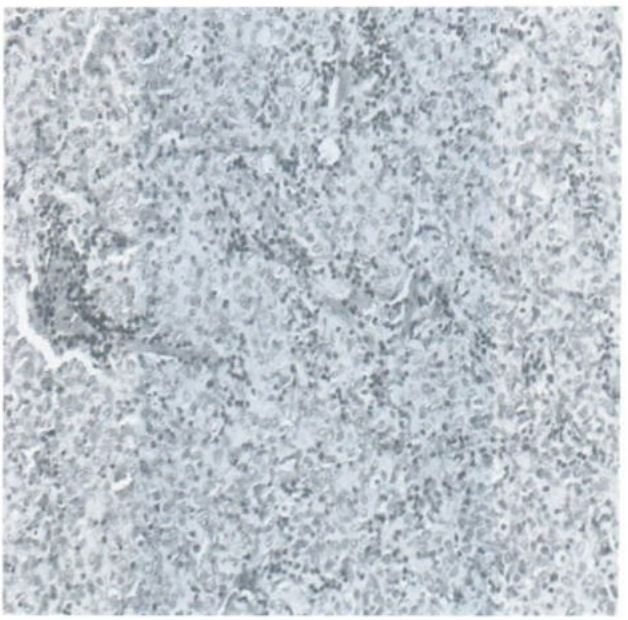


Figure 3A . Pieces of poorly differentiated malignant neoplasm arranged in sheets and solid patterns with squamoid appearing in anaplastic thyroid carcinoma. (100x)

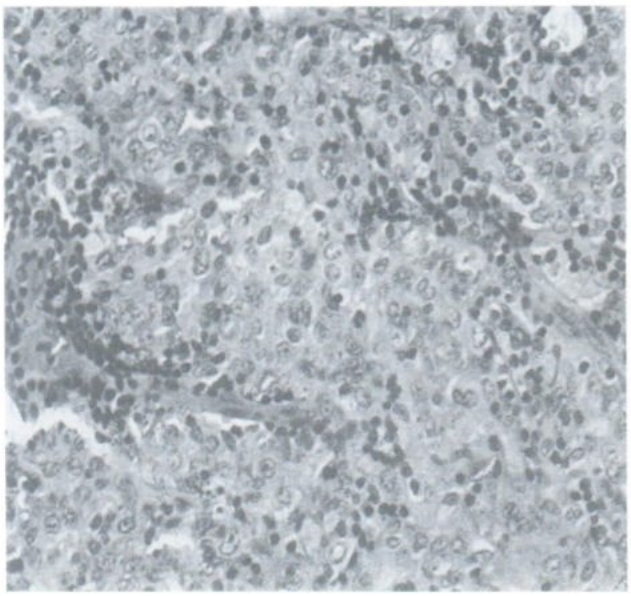


Figure 3B. There are scattered inflammatory cells predominantly lymphocytic infiltrate in anaplastic thyroid carcinoma. (200x)

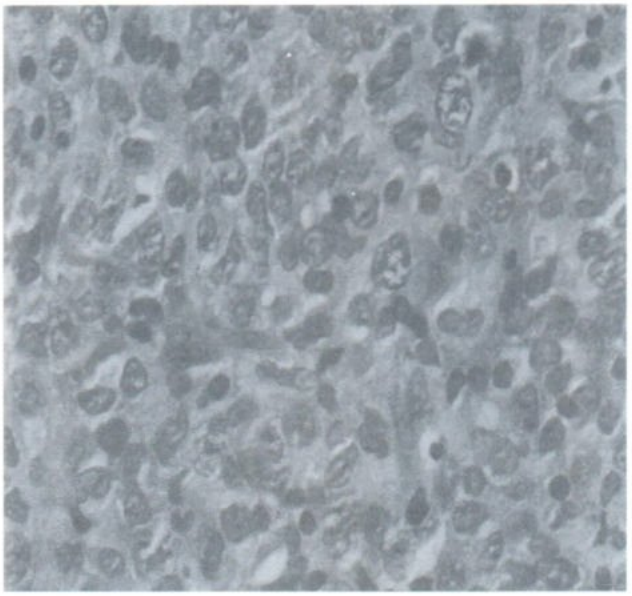


Figure 3C. The nuclei were pleomorphic with frequent mitosis in anaplastic thyroid carcinoma. (400x)

Figure 3D. (Before treatment)

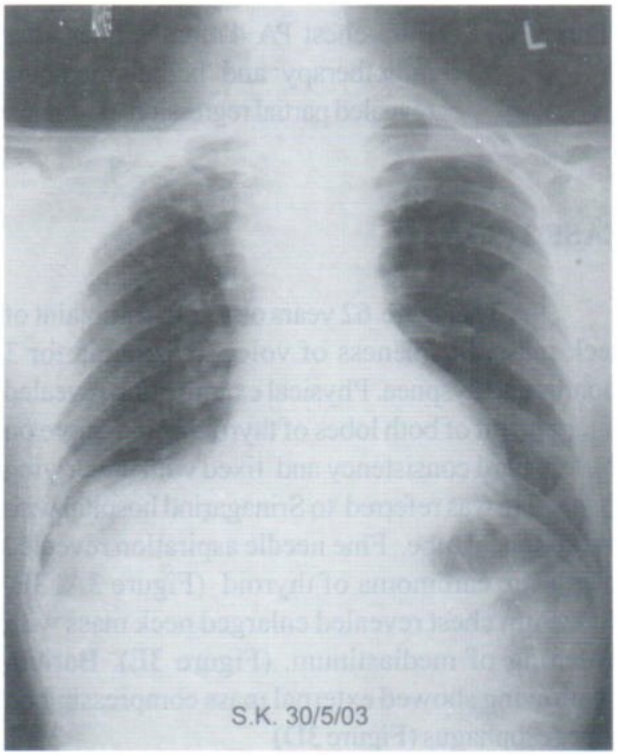
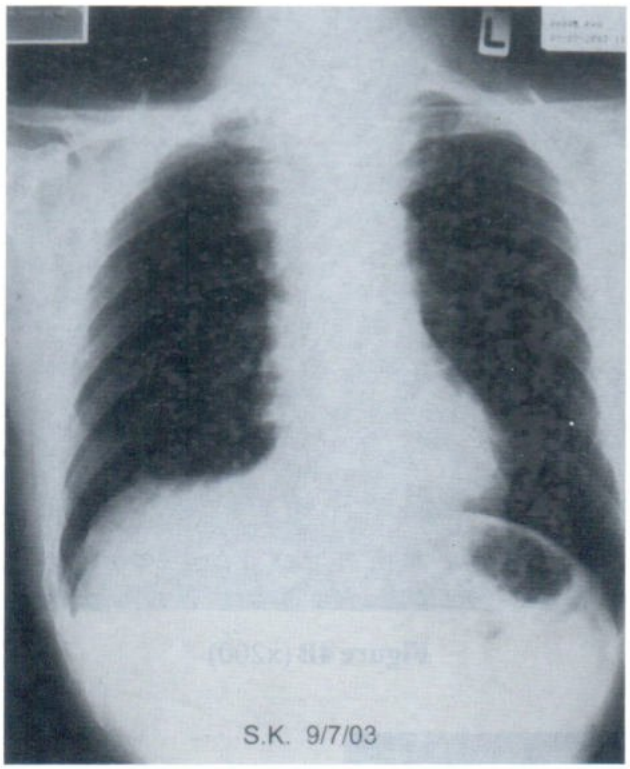


Figure 3E. (Before treatment)

Figure 3D : Barium swallowing showed external mass compress on upper esophagus.
Figure 3E : Film chest revealed enlarged neck mass with widening of mediastinum.



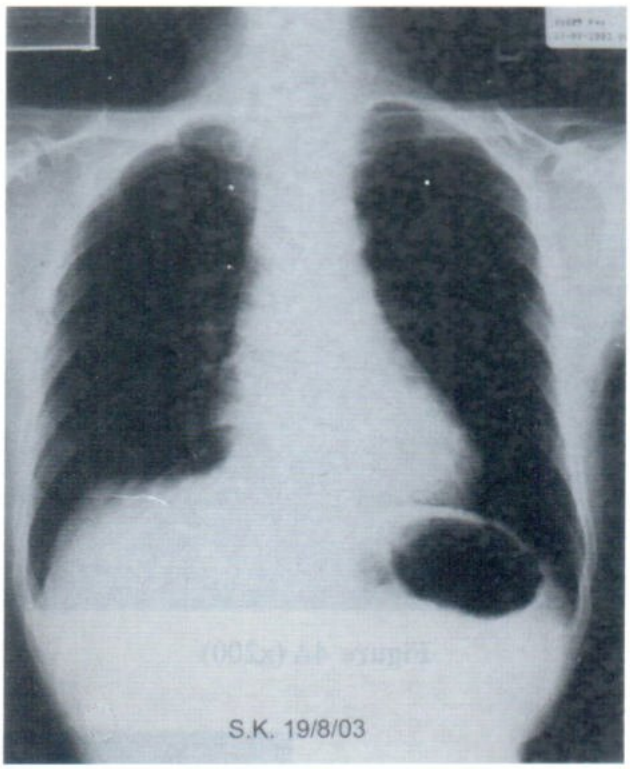


Figure 3F (9 weeks after treatment) **Figure 3G** (14.5 weeks after treatment.)

Figure 3F, 3G : Chest film revealed nearly complete regression of the thyroid mass.

CASE 4

A Thai boy 14 years old with a history of polydipsea, polyurea for 4-5 months, followed by headaches, blurred vision, weakness of upper and lower extremities. The patient became semiconscious, can not walk and talk when admitted. Craniotomy was performed and tumour biopsy reveals oligodendroglioma. (Figure 4A, 4B, 4C) Computed tomography brain scan found to have wide spreading subependymal tumors with dilatation of the whole ventricles as shown in Figure 4D, 4E, 4F, 4G, 4H, 4I,4J

TREATMENT

1. Steroid intravenous therapy to reduce brain edema before radiotherapy. 2. Teletherapy (Cobalt 60.unit machine), whole brain irradiation , tumour dose of 2850 cGy/9 weeks (titration dose) with herbal tonic batch No. G716/45 15c.c orally O.D.pc. 3. VP-shunt to relief severe hydrocephalus after a tumour dose of 575 cGy/4 weeks

The result of treatment in this case revealed much improvement of symptoms. The patient can walk right after completion of treatment and can communicate with other people. Computed tomography brain scan revealed severe hydrocephalus with no evidence of tumour left in ventricles or the subependymal areas as shown in Figure 4K, 4L, 4M. (tumour dose 575 cGy/4 weeks) and Figure 4N, 4O. (Tumour dose 2850 cGy/9 weeks). Prolonged time of radiation treatment due to *E-coli* septicemia and poor general condition. The patient shows good quality of life up until the last follow up 6 months after treatment.

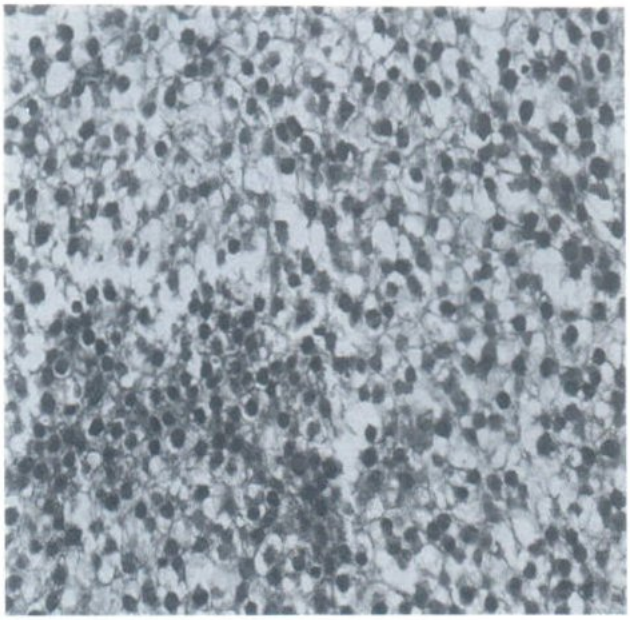


Figure 4A (x200)

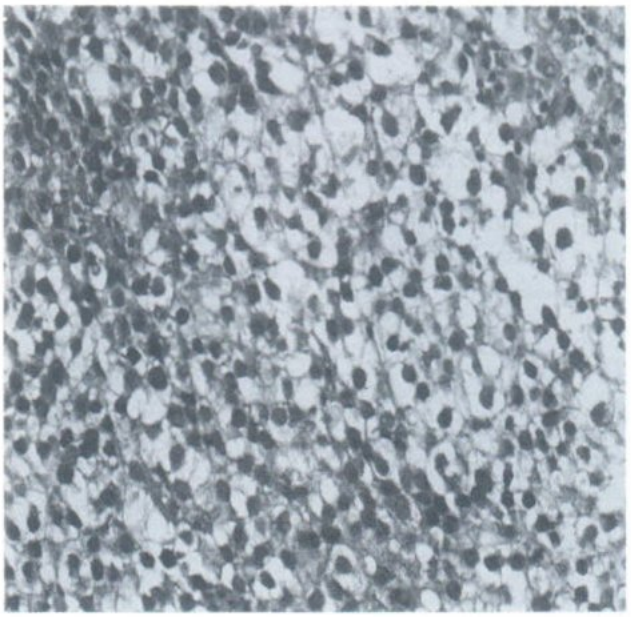


Figure 4B (x200)

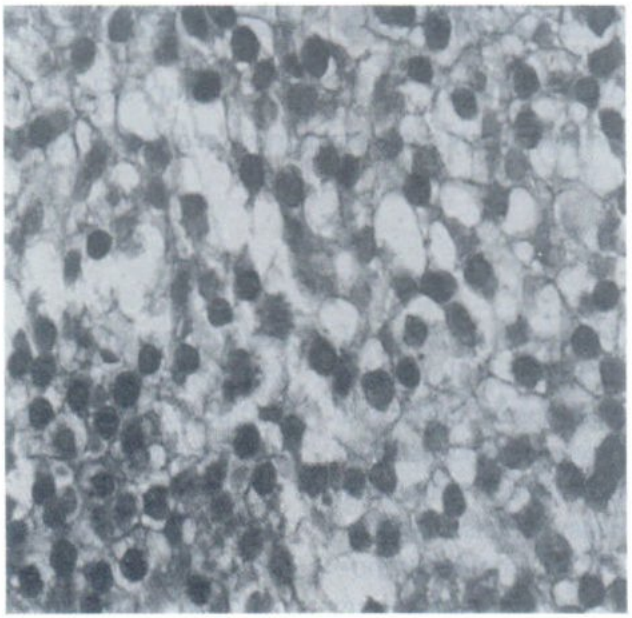


Figure 4C (x400)

Figure 4A, 4B, 4C **Microscopic picture, Brain, right lateral** ventricle:-
Oligodendroglioma . Figure 4A :The tumor composed of uniform round cells with scanty vascular septa.Figure 4B: The cytoplasm was moderate and clear.
Figure 4C : The nuclei were round and uniform. The nuclear chromatin was rather delicate

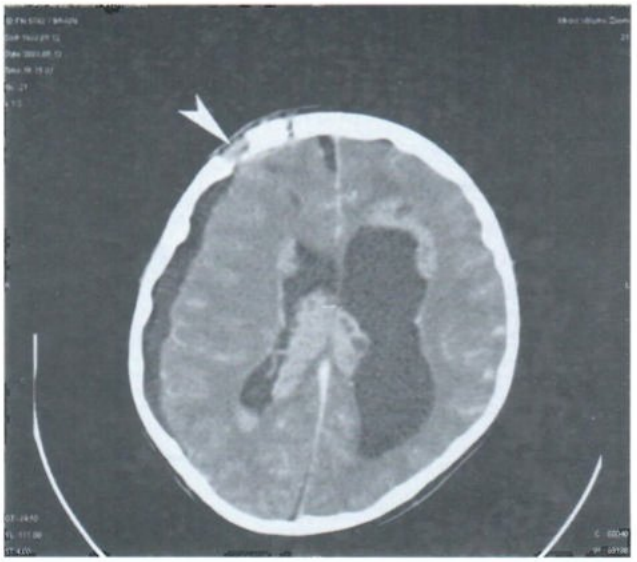


Figure 4D.

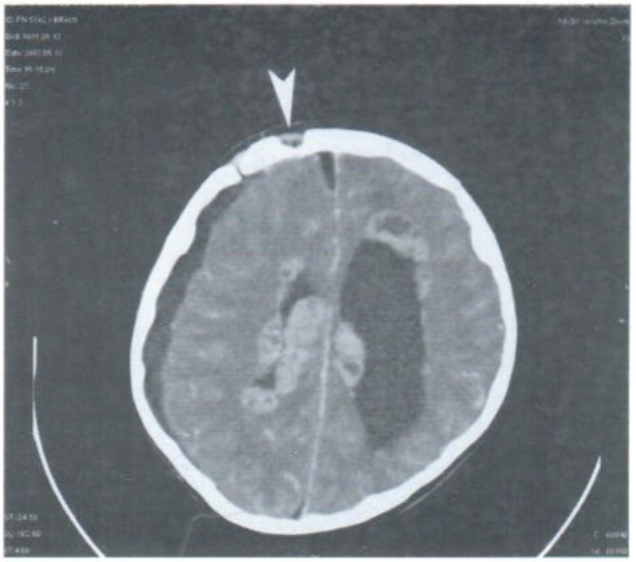


Figure 4E.

Figure 4D, 4E : Computed tomography brain scan found to have progressive subependymal tumour with dilatation of the whole ventricles and showing the craniotomy site for biopsy. (Before treatment)

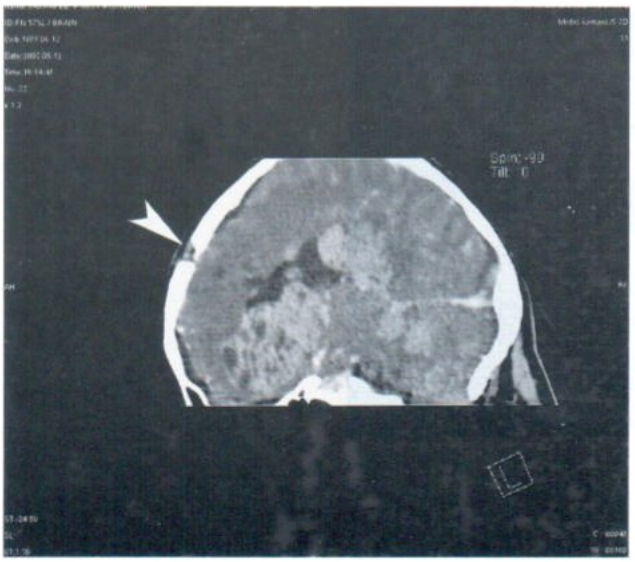


Figure 4F.

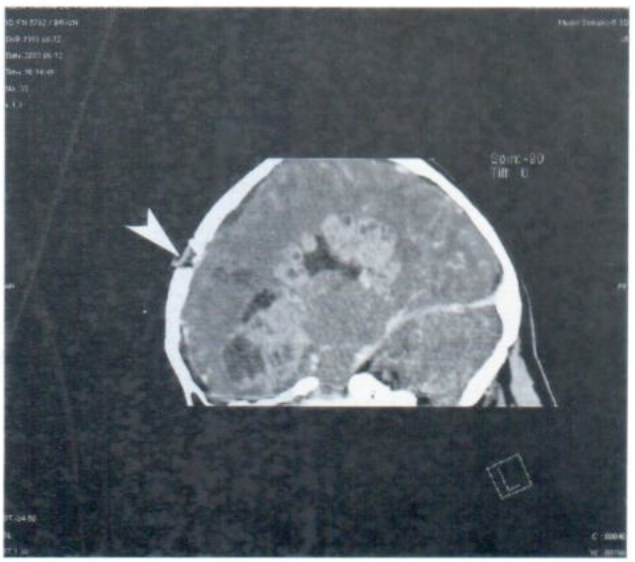


Figure 4G.

Figure 4F, 4G : Computed tomography brain scan found to have progressive subependymal tumour with dilatation of whole ventricles and showing the craniotomy site. (Before treatment)

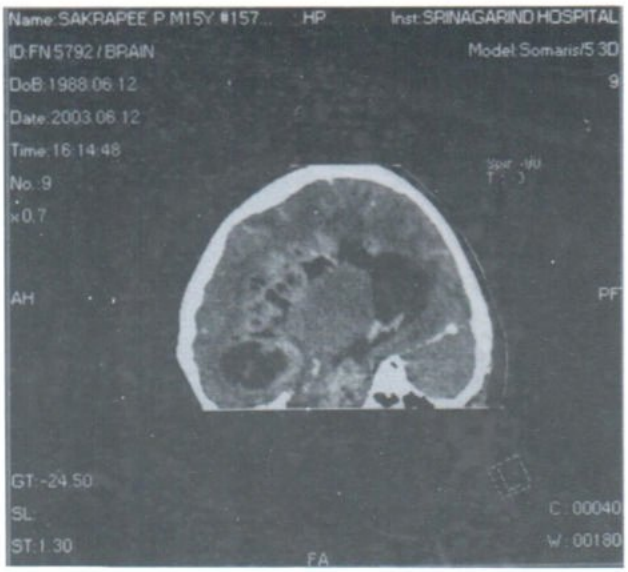


Figure 4H. (Before treatment)

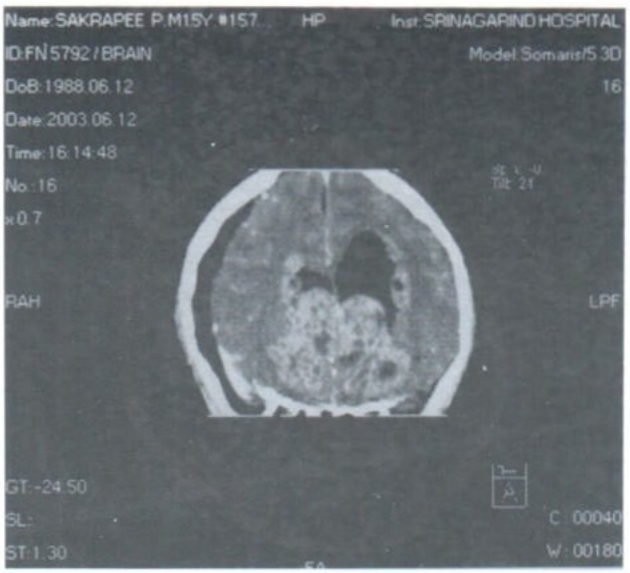


Figure 4I. (before treatment)

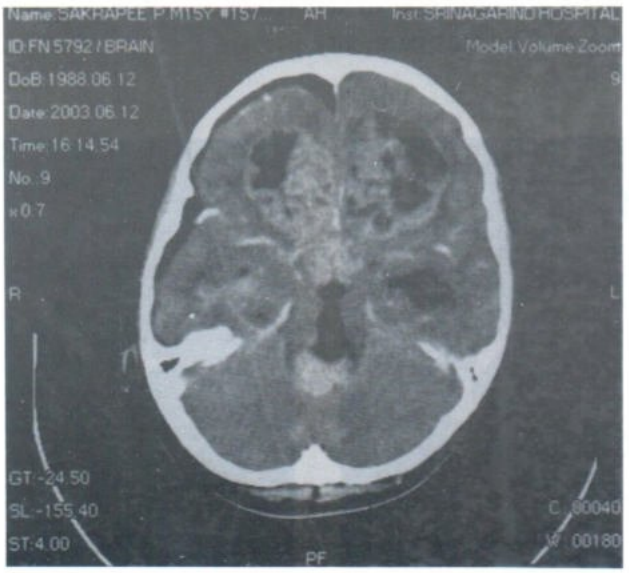


Figure 4J. (Before treatment)

Figure 4H, 4I, 4J : Computed tomography brain scan showing to have a wide spreading subependymal tumours with dilatation of the whole ventricles.
(N.B. The subpendymal tomours in this case was proved to be oligodendroglioma, Figure 4A, 4B, 4C.)

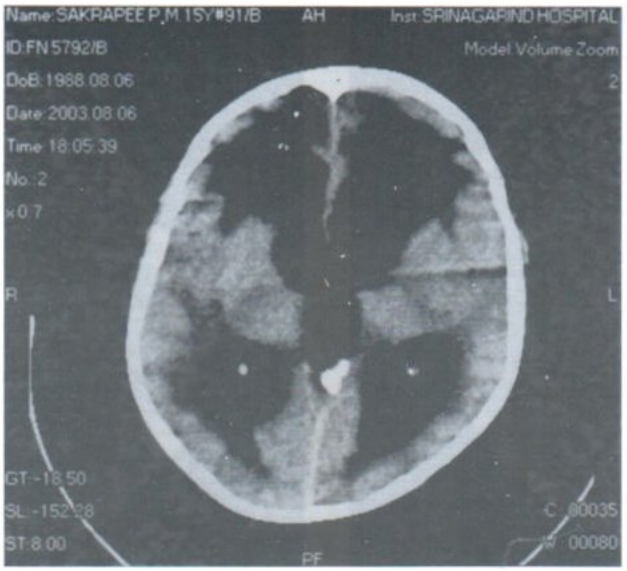


Figure 4K. (2 months after treatment)

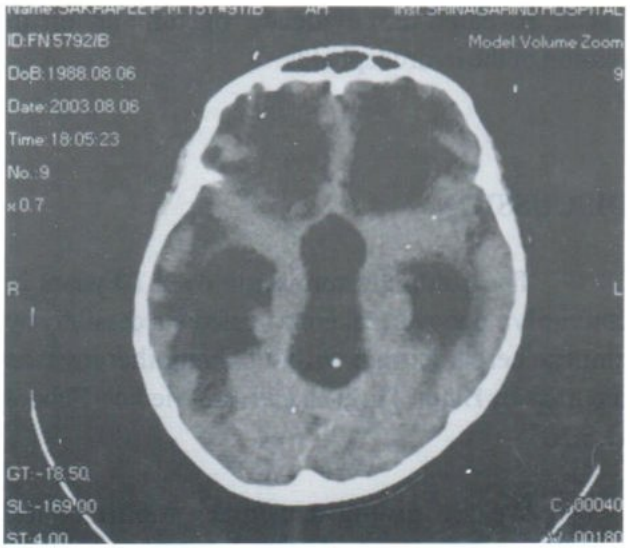


Figure 4L. (2 months after treatment)

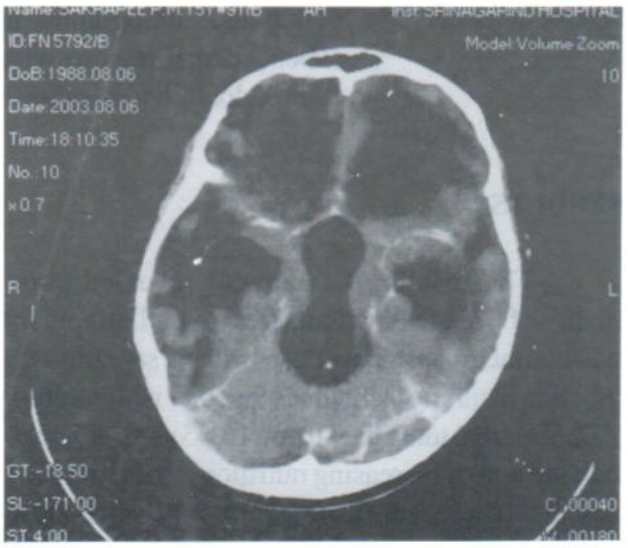


Figure 4M. (2 months after treatment)

Figure 4K, 4L, 4M : Computed tomography brain scan revealed severe hydrocephalus with no evidence of tumour left in ventricles. (tumour dose 575 cGy/4 weeks)

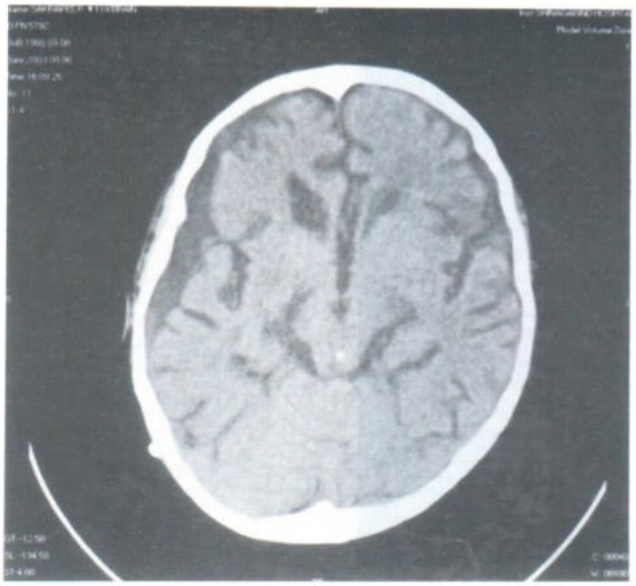


Figure 4N. (3 months after treatment)

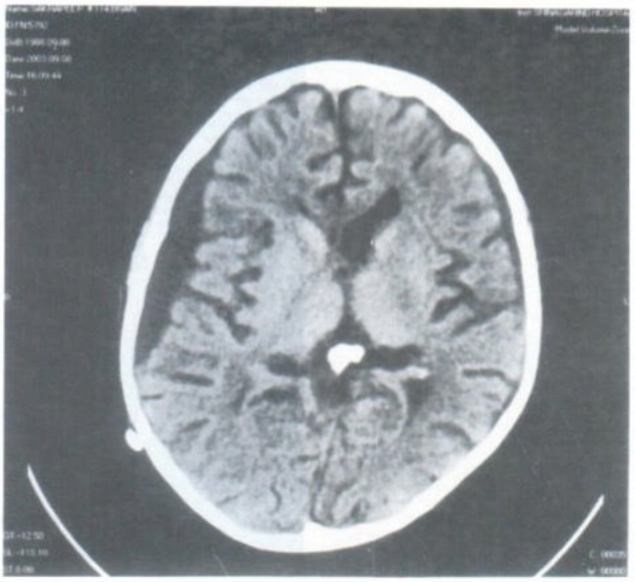


Figure 4O. (3 months after treatment)

Figure 4N, 4O : Computed tomography brain scan revealed no evidence of tumour left in subependemal regions with regression of the hydrocephalus. (tumor dose 2850 cGy/9 weeks)

RESULTS

The results of treatment revealed good quality of life of all patients treated palliatively by radiation therpy ; palliative doses without sophistigated radiation planning techniques together with solution of Thai Herbal tonic bacth No 716/45 as an adjuvant with the aim of increasing nutritional support to the patients. There were a variety of tumour response among the 100 cases entered into this clinical trial project. More than half of the cases entered into this clinical trial showed a better clinical improvement in comparison with the control group using palliative radiation therapy alone without this adjuvant therapy. The detail results of the other cases will be reported after having been follow up for a longer period of time.

DISCUSSION

The complete remission over 10 years in chronic lymphocyte leukemia treated successfully by chinese herbal extract without chemotherapy was reported by Battle TE. et al, Harvard Medical School U.S.A.[1]

We are giving a primary report of the usefulness of the Thai herbal medicine as an adjuvant remedy to a palliative dose of radiotherapy with complete regression of subependymal tumours of Oligodendroglioma, a radioresistant tumour, and another two advanced cases of CA lung , CA thyroid with one case of metastatic tumour to the lungs and mediastinal nodes causing a Superior Vena Cava obstruction Syndrome. All the four cases showed an immediate dramatic responses with clinical improvement and nearly complete regression of the tumours. We will followed all these cases and making a final report after 1 year.

The Thai Herbal extraction consisted of three main ingredients namely Ganoderma lucidum, Houttuynia cordata Thunb (leaves) and Boesenbergia pandurata Holtt (Kra Chai) which are edible plants, well known to the Thai people for several decades. They have been used as flavouring agents in cooking Thai food for countless generations in different parts of the country, especially for hot curries.

Ganoderma lucidum belongs to the Basidiomycotina class of fungi. The fruiting bodies of *G. lucidum* have been used as a tonic and a favorite remedy in China and other Asian countries for thousands of years.[2] Anti tumor effects of polysaccharides of *G.lucidum* was reported by Lee S.S et al.[2]

Houttuynia cordata Thumb (leaves) and Boesenbergia pandurata Holtt (Kra Chai) are edible plants of Thailand which were found to be a promissing source for effective anti-tumor promoting activities in vitro reported by Murakami A. et al.[3] Herbal tonic batch No G716/45 are healthy tonic for all persons (sick or well) and it has been registered as a tonic, available without prescription by the Thai food and drug council. Herbal tonic batch No.716/45 was proven to have no acute oral toxicity in animal study investigated by Suntorntanasat T. et al, Thailand Institute of Scientific and Technological Research.[4] (written personal communications).

From the results of our clinical trial, we are willing to continue our studies using The Thai herbal tonic (batch No.716/45) in combination with radiation therapy in hopeless advanced cancer cases and also in some earlier cases with radioresistant tumour to improve the cure rate or prolonged survival rate with good quality of life.

CONCLUSIONS

1. The results of radiotherapy in late stages of cancer using Thai herbal medicine as an adjuvant remedy in four kinds of advanced cancer such as lung, thyroid and brain are very promising with good quality of life and prolonged remission periods.

2. This combinations adjuvant therapy is promissing in the aspect of cost effectiveness and availability.

3. It is worthwhile to have further studies not only for the palliative effect but also the curative effect with low cost and readily available in our country.

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REFERENCES

1. Battle TE, Castro-Malaspina H, Gribben JG, et al. Sustained complete remission of CLL associated with the use of a Chinese herbal extract : case report and mechanistic analy sis. Leukemia Research 2003 ; 27 (9) : 859-863.

2. Lee S - S, Wei Y - H, Chen C - F, et al. Anti-tumor effects of Polysaccharides of *Ganoderma lucidum*. Proc Int Symposium Ganoderma Sci, Auckland, 27-29 April, 2001, 1-6.
3. Murakami A, Jiwajinda S, Koshimizu K, et al. Screening for in vitro anti - tumor promoting activites of edible plants from Thailand. Cancer Lelters 1995 ; 95 : 139-146.
4. Suntorntanasat T, Banchonglikitkul C, Klungsupaya P, et al. Acute Oral Toxicity Test ". Herbal tonic batch No 716/45" Thailand Institute of Scientific and Technological Research. (Written personal communications.) September 2003, 1-8.

CARDIAC SARCOIDOSIS-MRI FINDINGS IN 4 CASES

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SUMMARY

Sarcoidosis is a multisystem granulomatous disease and symptomatic cardiac involvement is found in less than 5%. The diagnosis of cardiac sarcoidosis can be missed on endomyocardial biopsy because of the patchy distribution of lesions. We report 4 cases diagnosed using MRI.

Key words: magnetic resonance imaging(MRI); cardiac sarcoidosis

CASE REPORTS

CASE 1

A 69-year-old woman was admitted November 1997 for secondary AV Block.

A chest radiograph demonstrated hilar lymphadenopathy and a diagnosis of sarcoidosis was made on histology.

She was referred for an MRI of the heart to determine if there was any evidence of myocardial sarcoidosis.

MRI images demonstrated nodular lesions in the anterior and mid interventricular septum and anterolateral left ventricle at the level of the mitral valve.

Nodular lesions were hypointense to the myocardium on T1-weighted, proton density and T2-weighted sequences with a peripheral high signal intensity (Fig 1a).

The subcarinal and hilar lymph nodes were enlarged. The myocardial findings were interpreted as being consistent with either myocardial sarcoidosis or secondary deposits. In the clinical setting it was decided sarcoidosis to be the most likely cause and patient was treated with oral corticosteroids.

A follow-up MRI in August 1998 was performed with limited sequences and orientation. There was focal nodular thickening of the anterior and mid interventricular septum and anterior left ventricle and STIR sequences demonstrated increase signal intensity (Fig1b). The subcarinal and hilar lymph nodes were enlarged.

A second follow-up MRI in January 1999 was performed .There was reduction in the septal

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and anterior left ventricular wall thickening and fewer nodular lesions in the mid septum and anterior left ventricle were present.(Fig1c). The subcarinal and hilar lymph nodes were enlarged. An endomyocardial biopsy was not performed.

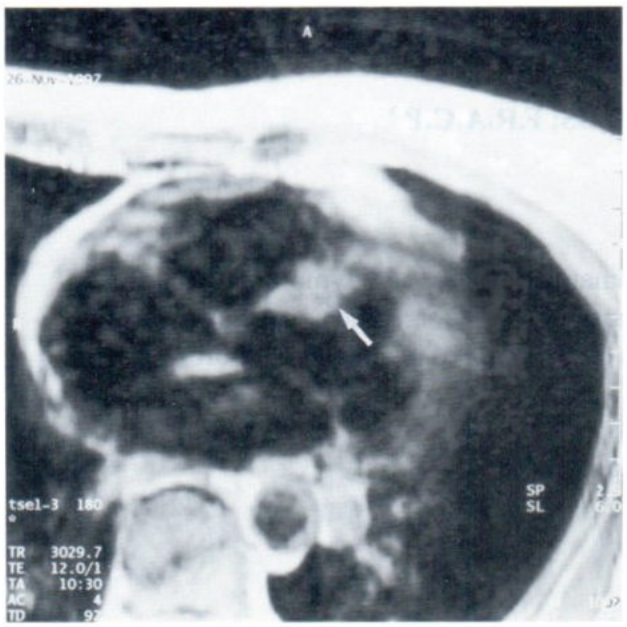

Fig 1a Axial proton density fast spin-echo image demonstrate hypointense nodular lesion in the mid interventricular septum with a periph eral high signal intensity.(arrow)

Fig 1b Follow-up axial STIR image demonstrate increase signal intensity and focal thickening at the anterior and mid interventricular sep tum and anterior left ventricle (arrow).

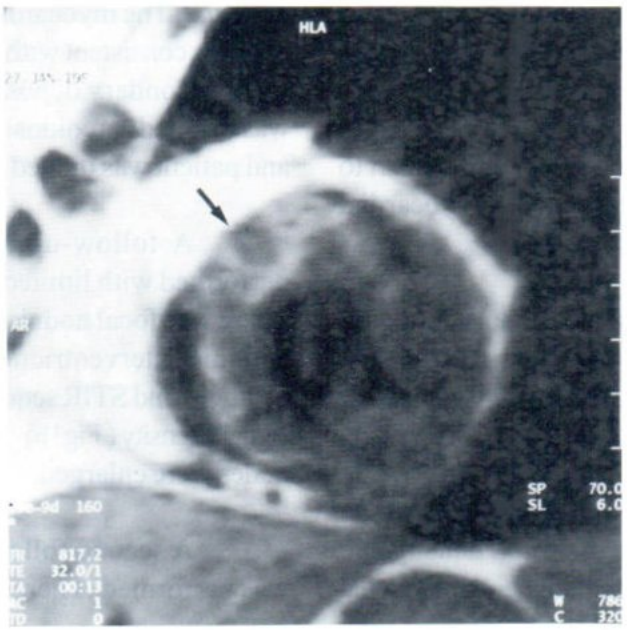

Fig 1c Follow-up short-axis T1- weighted fast spin-echo image reveal several hypointense nodular lesions with peripheral increase signal intensity in the interventricular septum (arrow)

CASE 2

A 59-year-old male with known history of pulmonary sarcoidosis and echocardiographic findings of left ventricular diastolic dysfunction was referred for a cardiac MRI in June 2002.An ECG-gated MRI was performed to rule out the presence of cardiac sarcoidosis. Gadolinium-enhanced images in the axial and short-axis orientation were obtained.

Cine sequences demonstrated a focal thinning of the anterior wall of the left ventricle at the apex of the heart. (Fig2a) The rest of the left ventricular wall demonstrated hypertrophy and normal contractility. There were a few focal areas of hypointense nodule in the anterior wall of the right ventricle, anterior and lateral wall of the right ventricular out-flow tract , anterior and mid inter-ventricular septum and anterolateral wall of the left ventricle and anterior papillary muscle. There was patchy enhancement of the anterior wall of the right ventricle and interventricular septum and peripheral enhancement of the nodule in the anterior papillary muscle.(Fig2b)

Multiple enlarged paratracheal, aorto-pulmonary window ,subcarinal and hilar lymph nodes were present. An endomyocardial biopsy was not performed.

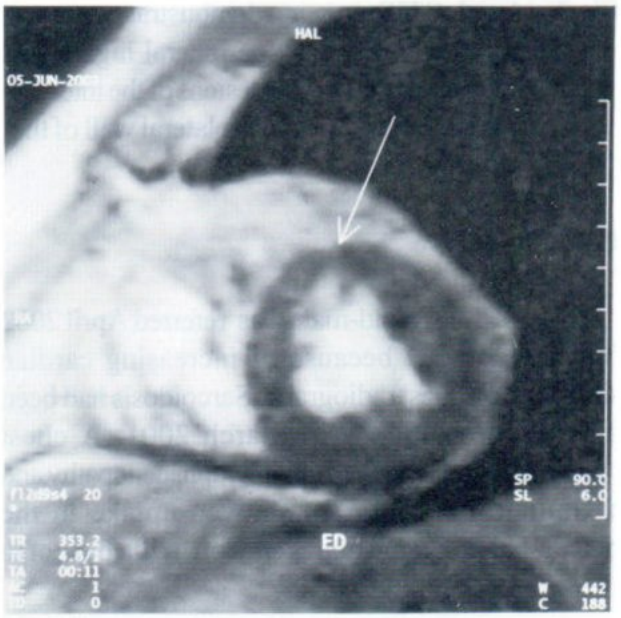

Fig2a Short - axis cine sequence at the apex of the heart end-diastolic (ED) image demonstrate focal thinning of the anterior wall of the left ventricle(arrow)

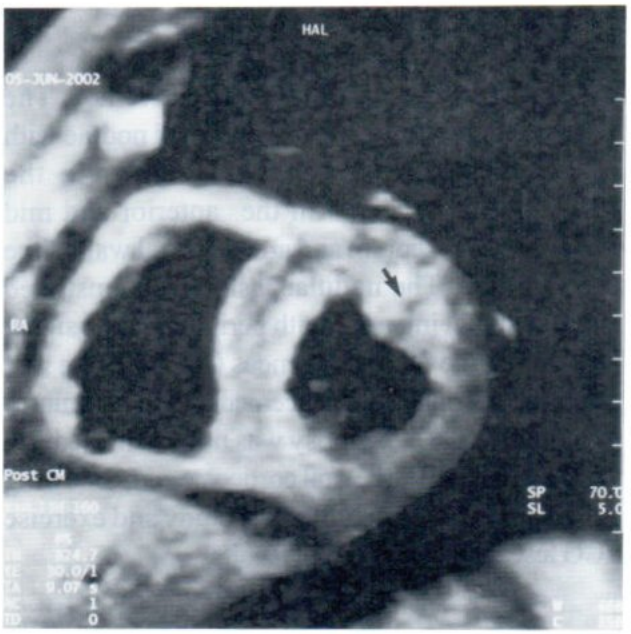

Fig2b Gadolininum-enhanced image in the short-axis orientation demonstrate peripheral enhance ment of the nodular lesion in the anterior papillary muscle.(arrow)

CASE 3

A 44-year- old male was referred in August 2000 for cardiac MRI on the basis of an echocardiographic findings raising the possibility of cardiac sarcoidosis. He was on high dose steroid treatment. He had presented in March of that year with malaise, fatigue and a persistent cough. He was shown on computed tomography (CT) scanning to have multiple pulmonary nodules, and at least two low attenuation lesions in his liver. A gallium scan was normal. An ECG showed a sinus tachycardia, and transthoracic echocardiography identified mild concentric hypertrophy and hyperkinetic function of the left ventricle and mild left ventricular diastolic dysfunction, mild left and right atrial enlargement, mild tricuspid regurgitation and mild pulmonary hypertension.

An ECG-gated MRI was performed. The MRI study demonstrated several small nodule with surrounding increase signal intensity in the T1-weighted spin-echo in the anterior and mid interventrcular septum and anterolateral wall of the left ventricle. The nodular lesions demonstrated increase signal intensity with peripheral high signal intensity in the STIR sequences (Fig3). There was patchy and peripheral enhancement with gadolinium. An endomyocardial biopsy was not performed. He improved on high dose oral corticosteroid, following which an ECG , Holter monitor study and exercise ECG test all yielded normal results.

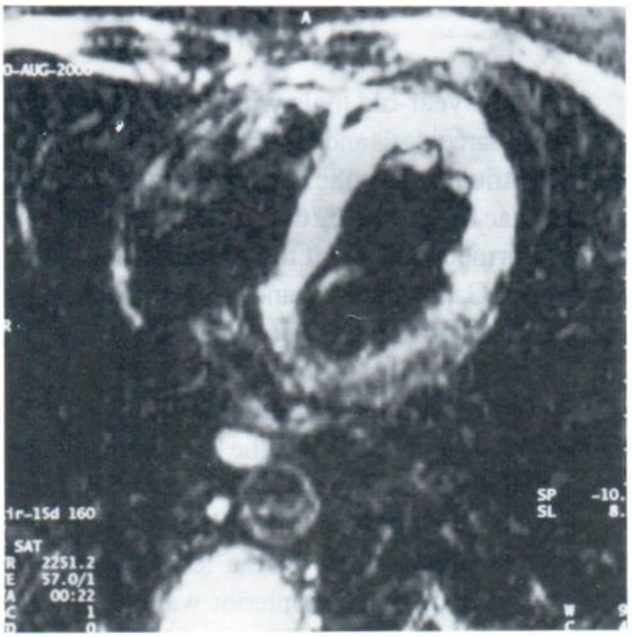

Fig 3 Axial STIR image demonstrate increase signal intensity with peripheral high signal intensity of the nodular lesions of the interventricular septum and anterolateral wall of the left ventricle.

CASE 4

A 75-year-old-male was referred April 2002 for cardiac MRI because of increasing cardiac silhouette on chest radiograph. Sarcoidosis had been diagnosed on biopsy in March 2001. A chest radiograph demonstrated hilar lymphadenopathy and a Gallium-67scintigram showed uptake in the bilateral hilar lymph nodes and left axilla but not in

the heart. A HRCT performed in April 2001 confirmed enlarged hilar lymph nodes but there was no evidence of interstitial lung disease. He was started on high oral corticosteroids.

A repeat HRCT in March 2002 demonstrated persistent enlargement of the hilar lymph nodes and increasing size of the heart. A transthoracic echocardiography demonstrated moderate left ventricular diastolic dysfunction, and right and left atrial enlargement .There was moderate pulmonary hypertension but no evidence of cardiac sarcoidosis. A MRI scan was suggested for evaluation of cardiac sarcoidosis. MRI demonstrated moderate right and left atrial enlargement and pulmonary hypertension. There was concentric hypertrophy of the left ventricular myocardium. The interventricular septum was thickened and demonstrated mild diffuse increase signal intensity in T1-weighted sequences which was more prominent in the T2-weighted images. There was patchy enhancement of the interventricular septum and peripheral enhancement of a nodule in the anterior interventricular septum at the level of the mitral valve (Fig4). The hilar lymph nodes were enlarged. The patient underwent an endomyocardial biopsy which did not reveal sarcoid granuloma, giant cells, inflammation or fibrosis.

HRCT = Hilar Region CT.

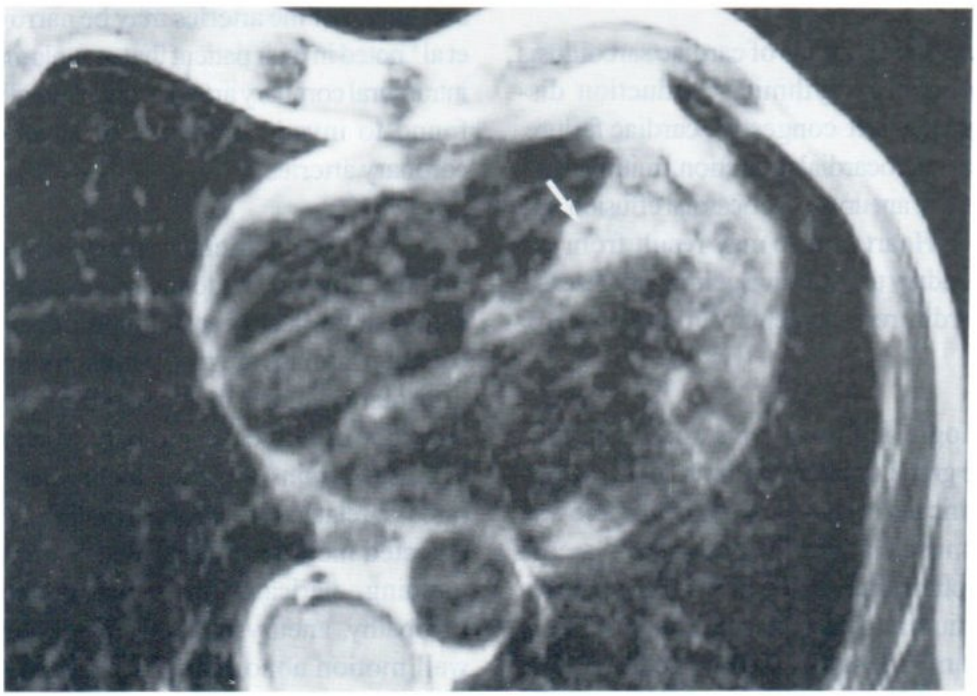

Fig 4 Axial gadolinium-enhanced image demonstrate peripheral enhancement of the nodule in the anterior interventricular septum.(arrow)

DISCUSSION

Sarcoidosis is a multisystem granulomatous disease .Cardiac involvement is symptomatic in less than 5% of patients,[1] but myocardial involvement in autopsy series has been identified in 20-27% of cases.[2] Sudden death due to ventricular tachyarrhythmias or conduction disturbances has been reported in 30-65% of identified cases of cardiac sarcoidosis [3,4] Most patients with cardiac sarcoidosis causing sudden death have preceding evidence of ventricular arrhythmias or evidence of high degrees of heart block.

Sudden death may be the initial manifestation of undiagnosed sarcoidosis and extensive cardiac infiltration with cardiac dysfunction are infrequently associated with dysfunction of another organ.[5]

Clinical presentations of cardiac sarcoidosis include ventricular arrhythmia, conduction disturbances , right and left congestive cardiac failure, cardiomyopathy, myocardial infarction, mitral insufficiency ,ventricular aneurysm, pericardial effusion and sudden death.[6,7] Heart failure may result from cor pulmonale secondary to extensive pulmonary disease, or from myocardial replacement by inflammation or fibrous tissue.[6]

Pathologic features of sarcoid cardiac disease include granulomatous infiltration of myocardium (interventricular septum, left ventricular free wall and papillary muscles) and fibrous scars.[2] Sarcoid involvement is often patchy.[6] The lesions occur mainly in the myocardium and the endocardium, and rarely in the epicardium. The septum is involved in 90% of autopsy cases with cardiac sarcoidosis, and the posterior part of the septum appears to be more commonly involved.[2,7] Sarcoid infiltration initially results in a thickened myocardium principally involving the interventricular septum, resulting in some cases, in asymmetric septal hypertrophy. Later, either due to corticosteroid therapy or as a result of natural course of the disease,resolution or scar occurs.[7] Left ventricular aneurysms, and congestive cardio-myopathy may develop secondary to myocardial fibrosis and scarring in healed sarcoid granulomas.[6]

The atrioventricular node and His bundle are involved frequently and this is thought to be responsible for the cardiac arrhythmias and conduction disturbances. Extensive granulomatous involvement of the sinus node has been reported in a patient who presented with sudden death.[4] Pericardium, coronary vessels, and cardiac valves are less commonly involved.

James [8] reported granulomas surrounding the intramural coronary arteries of atria,ventricles or both, and lumen of the arteries may be narrowed. Virmani et al [9] noted in their patient that granulomas surrounded intramural coronary arteries, and epithelioid cells were found to invade the walls of several intramural coronary arteries.

50% of patients with systemic sarcoidosis without clinical evidence of cardiac involvement demonstrate electrocardiographic changes The most common findings are repolarisation changes, conduction disturbances, and arrhythmias. Transmural infarction occurs less commonly.[11] Echocardiography is a useful non-invasive technique for detecting sarcoid -related cardiac abnormalities. Abnormalities detected include abnormal septal thickening and thinning, pericardial effusion , congestive cardiomyopathy, aneurysm of the left ventricle , and focal wall motion abnormalities.[7,12] Focal wall motion abnormality localised to the basal portion of the ventricular septum is unusual in coronary artery disease and suggests the possibility of cardiac sarcoid even in the absence of recognised systemic disease.[1]

However, early diagnosis of cardiac infiltration is difficult.[11]

Cardiac sarcoid may occur in the absence of radiological evidence of pulmonary or systemic disease , and the diagnosis should be suggested by cardiomegaly, congestive heart failure, pericardial effusion, or left ventricular aneurysm.[6]

Radionucleotide studies may be helpful in this regard.[6]

Isotope scans can detect cardiac involvement in patients with sarcoidosis but are limited by poor spatial resolution. Extensive cardiac sarcoidosis may be diagnosed by defect on scintigraphy using Gallium-67, Thallium-201 or Technetium-99m pyrophosphate in the absence of ischaemic heart disease.[10]

Endomyocardial biopsy or open heart biopsy is essential in the definitive diagnosis of cardiac involvement. However a negative biopsy does not exclude the diagnosis as sarcoid infiltrationis often is focal or patchy. Corticosteroid therapy converts sarcoid granulomas into dense scar tissue and the granulomas may disappear entirely.[9] A non-invasive diagnostic means of identifying cardiac sarcoid is required to detect patient with high risk of life threatening cardiac arrhythmias or cardiac damage.[7] Patient with sarcoidosis could then be evaluated regularly.

In 1988 ,Riedy et al(13) first reported the MR appearance of myocardial sarcoidosis.

The MR study demonstrated multiple,discrete high signal intensity masses in the first- echo which increased in signal intensity on the second-echo image. The masses were within the anterolateral and posterior left ventricular wall and the basal portion of the septum. The basal portion of the septum was thickened. The initial endomyocardial biopsy before the MR study was non-diagnostic, but a repeat biopsy of the interventricular septum, directed by MR findings revealed typical sarcoid granuloma.

Matsuki et al [3] first reported gadolinium -enhanced MRI findings in cardiac sarcoidosis. The T1-weighted spin-echo images demonstrated nodular lesion with low signal intensity within the basal portion of the ventricular septum, with a central portion of even lower signal intensity. The T2-weighted images demonstrated peripheral areas of the nodule with high signal intensity. Gadolinium-enhanced T1-weighted images revealed peripheral enhancement. The central portion of the nodule showed low signal intensity in both the T1- and T2-weighted images.

Otake et al (14) reported nine patients with the nodular type of muscular sarcoidosis. The lesions consisted of a star-shaped area of low signal intensity in both T1-and T2 -weighted spin-echo surrounded by an area of high signal intensity Histopathology of nodular sarcoidosis involving the skeletal muscle demonstrated that low signal intensity on both T1-and T2-weighted images surrounded by an area of high signal intensity on T2-weighted images arose from central areas of hyaline fibrotic tissue and peripheral areas of active inflammatory granulomatous tissue.

Shimada et al [11] in a study of histologically proven cardiac sarcoidosis in 8 patients demonstrated localised enhancement, indicating interstitial odema and inflammation.

Cardiac lesions were demonstrated as areas of high signal intensity on T1-weighted spin-echo images and they suggested these findings to represent active inflammation. Following a month of steroid therapy, the enhanced areas were markedly diminished in size and signal intensity, indicating reduce interstitial odema associated with active inflammation and the response to steroid therapy.

Vignaux et al [15] described a range of abnormalities on MRI in cardiac sarcoidosis. These included focal myocardial thickening, focal intramyocardial increased signal intensity on T2-weighted sequences, focal intramyocardial

increased signal intensity on gadolinium DTPA -enhanced T1-weighted images, or a combination of these findings. The MRI findings were grouped into three patterns: the pure nodular pattern with a peripheral increased and a central decreased intramyocardial signal intensity on both T2-weighted and gadolinium-DTPA-enhanced T1-weighted images, the inflammatory focal or patchy pattern with increased signal intensity on gadolinium-DTPA -enhanced T1-weighted images with or without myocardial thickening, and the post-inflammatory pattern with focal increased intensity on T2- weighted images (but no gadolinium enhancement) with or without myocardial thinning. The focal increased signal intensity on T2-weighted images without gadolinium enhancement occurs in scar tissue with a fibrotic component and may occur in chronic ischaemic heart disease.[15] Inoue et al [10] demonstrated enhancement of active inflammation and during the healing stage of cardiac sarcoid but not in scar tissue.

MRI is capable in demonstrating post inflammatory scarring from healed sarcoid granulomas. MRI due to its high spatial resolution , can detect scarring even limited to the subendocardium with both static and functional imaging techniques. Both regional and global ventricular function can be evaluated. Hilar and mediastinal lymphadenopathy can be imaged.[16] MRI is non-invasive and is recommended in early detection of myocardial involvement, as many as 60% of these patients sudden death may be the first manifestation of cardiac sarcoidosis.[15]

The present study demonstrated hypointense irregular nodules in T1-weighted, proton density, and T2-weighted sequences with surrounding high signal intensity. STIR sequences demonstrated increased signal intensity at the centre of the nodule and high signal intensity in the periphery in the third case and focal thickening and increase signal intensity in the first case. There was patchy enhancement and few nodules demonstrated peripheral enhancement.

In addition , in the second patient nodular lesions were demonstrated in the right ventricle. There was a focal thinning and reduced thickening during systole in the anterior wall of the left ventricle with hypertrophy of the remainder of the left ventricular myocardium, indicating focal scarring.

The first patient in our series underwent serial MRI over a period of 2 years confirming the abnormalities. Gadolinium-enhanced sequences were not obtained in the first two MRI studies. Only a few nodule demonstrated peripheral enhancement suggesting active inflammation. Lesion without enhancement are thought to be most likely to be scar tissue.[15] In patients three and four , the clinical cardiological abnormalities resolved with high dose corticosteroid therapy, and repeat MRI studies could not be justified.

Our study has limitation that endomyocardial biopsy was not performed in all the patients and ,we are unable to correlate MRI appearances with histologic findings. The patchy distribution of lesions means that the diagnostic yield from biopsy is low and significant cardiac disease may be missed . The patchy distribution and predilection for left ventricle and interventricular septum (usually the basal portion) is characteristic. Differential diagnosis of multiple myocardial lesions include other granulomatous diseases, abscesses, and metastases The diagnosis of cardiac sarcoidosis was strongly suspected in these 4 patients and other causes of cardiac disease were excluded.

CONCLUSION

Early diagnosis of myocardial involvement is important so that steroid treatment can be initiated to prevent malignant arrhythmias and improve left ventricular function. Myocardial infiltration is patchy and focal, and sampling error may occur with endomyocardial biopsy. With relevant clinical findings, the security of a provisional diagnosis of cardiac sarcoid can be greatly increased with MRI.

Such imaging also provide information about the extent of cardiac involvement and assist in guiding endomyocardial biopsy.

The indications for treatment in sarcoidosis are symptoms, hypercalcemia and evidence of organ damage. Thus cardiac MRI may be invaluable in guiding the initiation and duration of such therapy. This limited series suggests that MRI should be employed more frequently in the diagnosis and management of cardiac sarcoidosis.

REFERENCES

1. Valentine H, McKenna WJ, Nihoyannopoulos P, Mitchell A, Foale RA, Davies MJ, Oakley CM. Sarcoidosis : a pattern of clinical and morphological presentation. Br Heart J 1987; 57: 256-263.
2. Silverman KJ, Hutchins GM, Bulkley BH. Cardiac sarcoid : a clinicopathologic study of 84 unselected patients with systemic sarcoidosis. Circulation 1978; 58: 1204-1211
3. Matsuki M, Matsuo M. MR findings of myocardial sarcoidosis. Clin Radiol 2000; 55:323-325
4. Abeler V. Sarcoidosis of the cardiac conducting system. Am Heart J 1979; 97:701-707
5. Roberts WC, McAllister HA Jr, Ferrans VJ : Sarcoidosis of the heart ; a clinicopathologic study of 35 necropsy patients (GroupI) and review of 78 previously described necropsy patients (GroupII). Am J Med 1977 ; 63 : 86-108
6. Chiles C, Adams G W, Ravin C E. Radiographic manifestations of cardiac sarcoid. AJR 1985; 145:711-714
7. Lewin R F, Mor R, Spitzer S , Arditti A, Hellman C, Agmon J . Echocardiographic evaluation of patients with systemic sarcoidosis. Am Heart J 1985;110: 116-122.
8. James T N.Sarcoid heart disease.Circulation 1977; 56: 320-326.
9. Virmani R, Bures J C, Roberts W C. Structure - function correlations in cardiovascular and pulmonary diseases(CPC) Chest 1980 ; 77 : 423-428.
10. Inoue SI , Shimada T, Murakami Y. Clinical significance of Gadolinium - DTPA - enhanced MRI for detection of myocardial lesions in a patient with sarcoidosis. Clinical Radiology 1999;54: 70-72.
11. Shimada T, Shimada K, Sakane T, Ochiai K, Tsukihashi H, Fukui M, Inoue S, Katoh H, Murakami Y, Ishibashi Y, Maruyama R. Diagnosis of cardiac sarcoidosis and evaluation of the effects of steroid therapy by Gadolinium - DTPA - enhanced magnetic resonance imaging. Am J Med 2001; 110 : 520-527.
12. Lull RJ, Dunn BE, Gregoratos G, Cox WA, Fisher G W : Ventricular aneurysm due to cardiac sarcoidosis with surgical cure of refractory ventricular tachycardia. Am J Cardiol 1972; 30: 282- 287
13. Riedy K, Fisher MR, Belic N , Koenigsberg DI. MR Imaging of Myocardial Sarcoido sis. AJR 1988; 151:915-916.
14. Otake S, Banno T, Ohba S , Ohba S, Noda M, Yamamoto M. Muscular sarcoidosis : findings at MR imaging .Radiology 1990;176: 145-148.
15. Vignaux O, Dhote R, Duboc D, Blanche P, Devaux J-Y, Weber S, Legmann P.Detection of myocardial involvement in patients with sarcoidosis applying T2- weighted, contrast -enhanced, and cine magnetic resonance imaging: initial results of a prospective study. J.Comput Assist Tomogr 2002;26:762-7671
16. Chandra M, Silverman M, Oshinski J, Pettigrew R. Diagnosis of Cardiac Sarcoidosis Aided by MRI. Chest 1996 ; 110 : 562-565.

ABDOMINAL ULTRASOUND

M.A.TAHER

Depending on the clinical indications, an ultrasound examination may include the entire abdomen and retroperitoneum, a single organ, or several organs. A combination of structures may be imaged because of location (e.g. upper abdominal scan, right upper quadrant organs) or function (e.g., biliary system [liver, gallbladder, and bile ducts], both kidneys). For some patients, more focused examinations may be appropriate for evaluation of specific clinical indications or to follow-up a known abnormality. In some cases, additional and/or specialized examinations may be necessary (e.g., spectral, color, or power Doppler). While it is not possible to detect every abnormality using ultrasound examination of the abdomen and retroperitoneum, adherence to the following standards will maximize the probability of detecting abnormalities.

INDICATIONS/CONTRAINDICATIONS

Indications for ultrasound examination of the abdomen and retroperitoneum include, but are not limited to,

A. Abdominal, flank, and/or back pain.
B. Pain that may be referred from the abdominal or retroperitoneal regions.
C. Palpable abnormalities, such as possible abdominal mass or organomegaly.
D. Abnormal laboratory values suggestive of abdominal or retroperitoneal pathology.
E. Follow-up of known or suspected abnormalities in the abdomen or retroperitoneum.
F. Search for metastatic disease or occult primary.
G. Evaluation of suspected congenital abnormalities.
H. Abdominal trauma.
I. Pre-and post-transplantation evaluation.

There is no absolute contraindication.

SPECIFICATIONS FOR INDIVIDUAL EXAMINATIONS

A. Abdomen

1. Liver

The examination of the liver should include long axis and transverse views. The liver parenchyma should be evaluated for local and/or diffuse abnormalities. If possible, the echogenicity of the liver should be compared with that of the right kidney. In addition, the following should be imaged :

a. The major vessels in the region of the liver, including the IVC, the hepatic veins, and the main, right, and left branches of the portal vein.

b. The hepatic lobes (right, left, and caudate) and, if possible, the hepatic fissures, the right hemidiaphragm, and the adjacent pleural space.

2. Gall bladder and biliary tract

The gall bladder evaluation should include long-axis and transverse views obtained in the supine position ; other positions, such as left lateral

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decubitus, erect, or prone positions, may be necessary to evaluate the gall bladder and its surrounding area completely, particularly when stones and/or sludge are observed. Wall measurements may aid in the determination of thickening. Tenderness to transducer compression may be assessed.

The intrahepatic ducts can be evaluated by obtaining views of the liver demonstrating the right and left branches of the portal vein. Doppler may be used to differentiate hepatic arteries and portal veins from bile ducts. The intrahepatic and extrahepatic bile ducts should be evaluated for dilatation, wall thickening, filling defects, and other abnormalities. The size of the bile duct in the porta hepatis should be documented. When visualized, the distal common bile duct in the pancreatic head should be evaluated. Routine gall bladder examination should be conducted on a filled gall bladder. Fasting for 8 hours prior to examination will permit adequate distension of a normally functioning gall bladder in adults and children. In infants and some adults, adequate distension may be achieved in less time.

COMMON ERRORS IN GALL BLADDER SCANNING

1. Failure to use the decubitus, "belly out", and erect positions when evaluating possible stones or sludge
2. Misdiagnosis of a hyperechoic spiral value as an impacted stone
3. Failure to identify an impacted stone at the neck of the gallbladder
4. Overdiagnosing gall bladder wall thickness in the post-prandial patient or in the patient with edema
5. Diagnosing artifacts in the gall bladder as sludge
6. Incomplete visualization of the gall bladder fundus from failure to use the intercostal approach
7. Failure to correctly identify the gall bladder when it looks atypically hyperechoic due to multiple stone and little bile
8. Mistaking the normal artifact generated at the gall bladder edges for acoustic shadowing caused by stone
9. Not visualizing the entire gall bladder lumen because it is folded over
10. Missing very small stones when they do not cause shadows

3. Pancreas

Whenever possible, all portions of the pancreas ; head, uncinate process, body, and tail, should be identified in long-axis and transverse projections. Orally administered water or contrast agent may afford better visualization of the pancreas through the stomach. The following should be assessed in the examination of the pancreas :

a. Parenchymal abnormalities.
b. The distal common bile duct in the region of the pancreatic head.
c. The pancreatic duct for dilatation and any other abnormalities, with dilatation confirmed by messurement.
d. The peripancreatic region for adenopathy and/ or fluid.

Doppler may be used to differentiate vascular from nonvascular structures.

4. Spleen

Representative views of the spleen in long -axis and transverse projections including right lateral decubitus should be obtained. Doppler may be used to determine the presence and direction of flow in the splenic vein and artery. Suspicion of splenic enlargement should be documented by measurement. Echogenicity of the left kidney should be compared with splenic echogenicity when possible. An attempt should be made to demonstrate the left hemidiaphragm and the adjacent pleural space.

5. Bowel

The bowel may be evaluated for wall thickening, dilatation, muscular hypertrophy, masses, and other abnormalities. Sonography of the pylorus and surrounding structures may be indicated in the evaluation of the vomiting infant.Graded compression sonography may be necessary to visualize the appendix or other bowel loops and might be combined with pelvic sonography in the evaluation of lower abdominal/pelvic pain. Wall measurements may be helpful in the determination of thickening.

B. Retroperitoneum

1. Kidney

The examination should include the long-axis and the transverse views of the upper pole(s), mid portion(s), and lower pole(s). The cortex and renal pelvic regions should be assessed. A maximum measurement of renal length should be recorded for both kidneys. Decubitus,prone,or upright positioning may provide better images of the kidney. When possible, renal echogenicity should be compared with the adjacent liver and spleen. The kidneys and perirenal regions should be assessed for abnormalities. Doppler may be used to differentiate vascular from nonvascular structures.

Note : For vascular examination of the kidneys, Doppler can be used as follows :

a. To assess renal arterial and venous patency.
b. To evaluated adults, suspected of having renal artery stenosis. For this application, detailed examination of the intra and extra-renal arterial tree should be included. When possible, bilateral, angle-adjusted measurements of the peak systolic velocity in the proximal, mid, and distal main renal arteries should be made. Peak systolic velocity of the adjacent aorta (or iliac artery in transplanted kidneys) should also be documented for calculation of renal aortic ratio. Within the kidney, spectral images of adequate size to allow evaluation of the early systolic peak may be obtained from the upper and lower pole (s) of the kidney.

COMMON ERRORS IN SCANNING THE KIDNEY

1. Failure to scan the contralateral kidney for evidence of obstruction when hydronephrosis is noted on the symptomic side
2. Mistaking prominent renal pyramids for hydronephrosis
3. Mistaking prominent renal pyramids for multiple small cysts
4. Interpreting an extensive extrarenal pelvis as a sign of obstruction
5. Failure to look for perinephric extravasation
6. Confusing normal renal arteries for the not normally visible ureter
7. Overdiagnosing hydronephrosis in the presence of a full bladder
8. Failure to appreciate the renal origin of a large cystic structure due to distortion of the normal anatomy
9. Failure to scan through the urinary bladder for a stone at the uretero-vesicle junction
10. Inability to visualize the left kidney completely because of transducer position anterior to the left posterior axillary line

2. Urinary bladder and adjacent structures

When performing a complete ultrasound evaluation of the urinary tract, images of the prostate gland, distended urinary bladder and its wall should be included, if possible. Bladder lumen or wall abnormalities should be noted. Dilatation or other distal ureteral abnormalities should be documented. Transverse and longitudinal scans may be used to demonstrate any post-void residual, which may be quantitated and reported. The transducer (usually 3.5 to 5 MHz) is placed just superior to the symphysis

pubis and angled caudad to visualize the prostate.

3. Adrenal glands

When possible, usually in the newborn or young infant, long-axis and transverse images of the adrenal glands can be obtained. The adrenal glands are infrequently seen in adults. When visualized, the shape and size of the gland should be documented, as well as the presence of hemorrhage, masses, or other abnormalities.

4. Aorta

Transverse and longitudinal images of the abdominal aorta should be obtained. Dimensions may be documented as appropriate in the proximal, mid, and distal aorta and proximal iliac arteries. Patency/ stenosis may be evaluated with Doppler. If an aneurysm is present, the maximal anteroposterior(AP) and transverse size of the aneurysm should be measured. Measurements should be from outer wall to outer wall. Surrounding solf tissues should be evaluated for any abnormality. If aortic rupture or dissection is clinically suspected, ultrasound may not be the initial examination of choice.

5. Inferior vena cava (IVC)

Transverse and longitudinal images of the IVC should be obtained. Patency and abnormalities may be evaluated with Doppler. Vena cava filters, interruption devices, or catheters may need to be localized with respect to the hepatic and/or renal veins.

ERRORS IN SONOGRAM FOR ABDOMINAL AORTIC ANEURYSM

1. Failure to adequately compress overlying bowel with probe pressure
2. Confusion of the vena cava with the aorta due to transmitted pulsations
3. Overestimating the aneurysmal width due to lack of a true cross section
4. Misinterpreting acoustic enhancement distal to the aorta as evidence of leakage
5. Failure to move the transducer off the sagittal plane while following a tortuous aorta
6. Neglecting to note the take-off of the renal arteries
7. Not measuring external diameter (outer wall to outer wall)
8. Reluctance to move the transducer far laterally in an attempt to visualize an aorta that is obscured by overlying bowel gas
9. Neglecting to visualize the bifurcation of the iliacs
10. Confusing artifact for thrombus

Obstetrics

a. Early pregnancy
   Fetal viability
   Description of the gestational sac, embryo and yolk sac
   Single and multiple gestation (chorionicity)
b. Pathology
   Early pregnancy failure
   Ectopic pregnancy
   Gross fetal abnormalities such as nuchal translucency, hydropic abnormalities
   Hydatidiform mole
   Associated pelvic tumors

Fetal anatomical features from 18 weeks

a. Shape of the skull ; nuchal fold
b. Brain : ventricles and cerebellum, choroid plexus
c. Facial profile
d. spine : Both longitudinally and transversely
e. Heart rate and rhythm, size and position, fourchamber view
f. Size and morphology and of the lungs
g. Shape of the thorax and abdomen
h. Abdomen : Diaphragm, stomach, liver and umbilicus
i. Limbs : Femur, tibia and fibula humerus,

radius and ulna, feet and hands, these to include shape, echogenicity and movement

j. Multiple pregnancy : Monochorionic and dichorionic, twin to twin transfusion syndrome

k. Amount of amniotic fluid : optimum/oligo or poly-hydramnios

l. Placental location

m. Cord and number of vessels

Fetal biometry

a. Crown-rump length, biparietal diameter, femur length, head circumferevce, abdominal circumference, interpretation of growth charts

Activity : recognize and quantify

a. Fetal movement

b. Breathing movements

c. Eye movements

Gynecology

Normal pelvic anatomy
Uterine size and endometrial thickness
Measurement of ovaries
Pelvic tumors e.g. fibroids, cysts, hydrosalpink
Peritoneal fluid
Intrauterine contraceptive devices.

ERRORS IN EMERGENCY PELVIC SONOGRAM

1. Failure to ensure a very full bladder when performing transabdominal scanning
2. Overinterpreting a small amount of fluid in the cul-de-sac as evidence of leakage from an ectopic pregnancy or from an ovarian cyst
3. Identifying a large ovarian cyst as urinary bladder
4. Assuming that a normal-appearing gestational sac with a viable embryo is necessarily intrauterine
5. Misdiagnosing an empty gestational sac of more than 2.5 cm as a normal early pregnancy
6. Mistaking a pseudo gestational sac for an intrauterine pregnancy
7. Misinterpreting the hyperechoic decidual reaction within the uterus as evidence of intrauterine pregnancy
8. Neglecting to obtain a quantitative hCG when the sonographic findings are not consistent with the dates
9. Neglecting to transabdominal scan when transvaginal scan dose not explain symptoms
10. Failure to consider all eight distinct possibilities in a patient with a positive hCG but no intrauterine pregnancy on ultrasound : (a) Confirmed Ectopic Pregnancy, (b) Highly likely Ectopic pregnancy, (c) Very Early Normal Pregnancy, (d) occult Unruptured Ectopic Pregnancy, (e) Complete or Incomplete Spontaneous Abortion (Miscarriage), (f) Dead Embryo, (g) Embryonic Resorption/ Blighted Ovum, (h) Hydatidiform Mole/Tro phoblastic Disease.

PENIS & SCROTUM

Because the penis and scrotal are superficial and of modest size, a high-resolution transducer of 5 to 10 MHz frequency is used. Several sonographic techniques may be used : (1) to place towels between the patient's legs to support the scrotum, or (2) to use one hand to hold the scrotum and the other hand to maneuver the transducer (it requires the presence of a second individual to operate the ultrasound controls). Color Doppler must be done with the instrument set to detect low-velocity flow. One testicle may be used as an acoustic window to bring the other testicle into the focal zone. The epididymis is usually of similar or slightly increased echogenicity to the normal testis. The srotal contents and penis should be scanned in longitudinal and transverse planes.

REFERENCES

1. American Institute of Ultrasound in Medicine, 2003.

2. Heller M, jehle D : Ultrasound in Emergency Medicine, Philadelphia, Saunders, 1995.
3. Zwiebel WJ. The Scrotum. In Zwiebel WJ, Sohaey R : Introduction to Ultrasound, Philadephia, WB Saunders, 1998, pp. 532-543.
4. Goldberg BB (ed.) : Textbook of Abdominal Ultrasound, Baltimore, Williams & Wilkins, 1993.
5. Donald I, Mc Vicar J, Brown TG : Investigation of abdominal masses by pulsed ultrasound. Lancet 1953 ; 1 : 1188-1194.

RENOVASCULAR HYPERTENSION IN AN ADULT : A CASE REPORT

M.A. TAHER, MD. REAJUL ISLAM

ABSTRACT

Radionuclide renogram was performed on a hypertensive adult male which revealed renovascular hypertension. We report it as a rare case.

KEY WORDS Renogram, Renovascular hypertension.

INTRODUCTION

Hypertension is reported to affect from 7% to 20% of the adult population. An exact prevalence is unknown, mainly because of differences in the study populations and the diagnostic criteria. Among the rare secondary causes of hypertension renovascular disorder is the most frequent. The prevalence depends not only on the source of the study population but also on the definition of hypertension in that population and on its severity. The prevalence of renovascular hypertension in a hypertensive population with diastolic pressure between 90 and 104 mmHg is probably less than 1% whereas in a population with a diastolic pressure above 125 mmHg the prevalence is reported to about 30%. With such a low prevalence in the largest group of patients, screening of all hypertensive patients for renovascular hypertension with either scintigraphy, intravenous urography (IVU), or digital angiography is not advisable owing to the low number of true positives, the cost and the unacceptably high false-positive rate. Before the patient is referred for an imaging examination, some selection must take place. Patients with a diastolic pressure above 110 mmHg, young patients, those with a sudden rise in blood pressure independent of age and patients with a poor response to therapy should be examined further. The captopril-enalapril renogram appears to be the most cost-effective procedure for screening those patients.[1] We like to report a case of renovascular hypertension in an adult considering its rarity.

CASE REPORT

A retired army commander aged 69 years was referred by a cardiologist for isotope renogram. His past medical history includes hypertension for the last 18 years and diabetes mellitus for the last 12 years (controlled by diet) and renal asymmetry in a recent ultrasonography (Left kidney 5x7 cm, right kidney 6x9 cm). Drug history includes methyldopa (6x250 mg daily), carvedilol (6.25 mgx2 per day), losan (50 mg daily) and nifedipine (4x10 mg/day). Renogram using intravenous 99m Tc DTPA under a computerized gamma camera (Siemens microdelta PC upgraded) revealed normally functioning right kidney, but left kidney showed small arterial (vascular) phase, prolonged secretory (glomerular) phase and delayed clearance (excretion) phase (Figure 1) suggesting renovascular hypertension.

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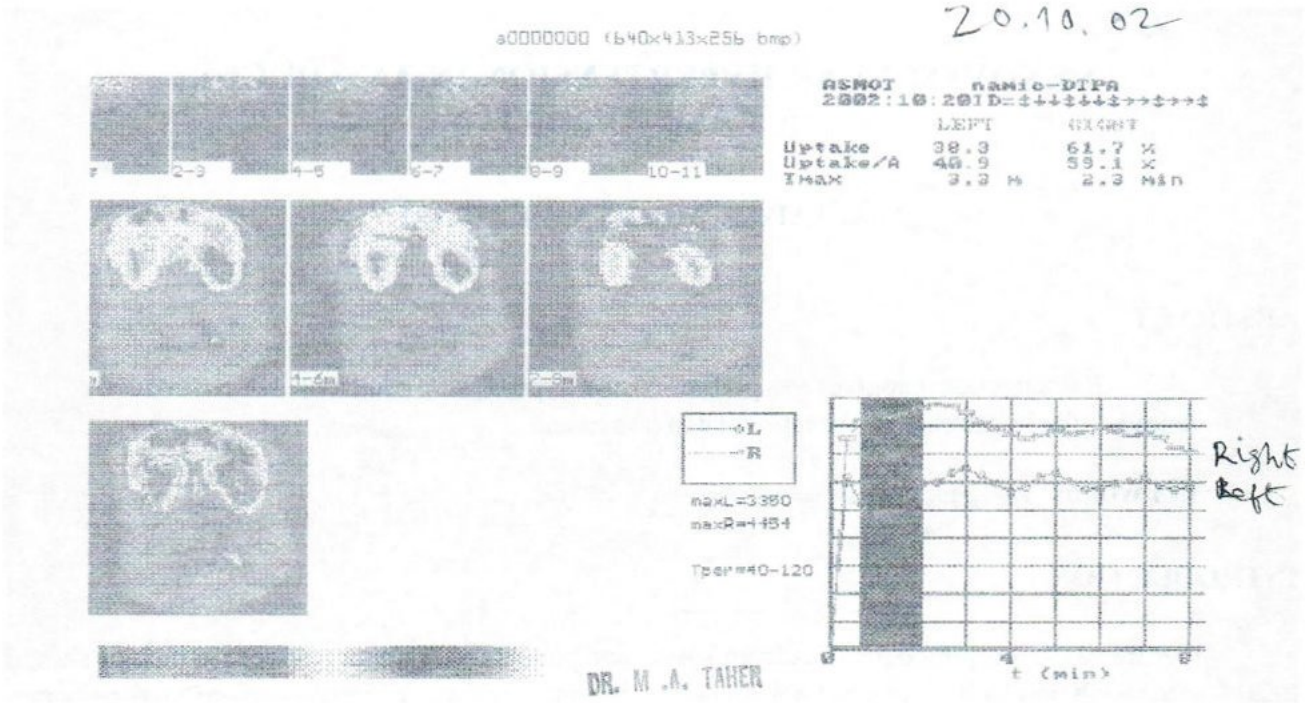

Fig. 1 Normal right kidney and ischemic left kidney suggesting renovascular hypertension.

DISCUSSION

In renovascular hypertension, one or both renal arteries are affected by a stenotic lesion that causes renal ischemia and subsequent stimulating of the renin-angiotensin system. The stenotic lesions are of 2 types-(a) fibromuscular hyperplasia, characterized by proliferation of the vascular media and is more commonly seen in young, otherwise healthy women, (b) atheromatous lesion affecting proximal renal artery, usually seen in older men who have evidence of widespread atherosclerotic disease.[2] Radionuclide renography is indicated in (a) patients under the age of 40, (b) those who have history, clinical examination or baseline investigation suggestive of renal pathology and (c) in older patients where difficulty in the control of hypertension or a sudden increase in severity may indicate a renal artery stenosis, IVU provides more information about urinary tract anatomy whereas radionuclide renogram gives a more direct estimate of renal hemodynamics. Measurement of plasma renin activity is a useful test in suspected renovascular hypertension but care is needed to ensure that samples are taken under proper basal conditions and are not affected by diuretic therapy and salt restriction.[3] Treatment of renovascular hypertension is surgical revascularization or angiotensin-converting enzyme inhibitors and/or other antihypertensive drugs.

REFERENCES

1. Thomsen HS, Pollack HM. The genitourinary system. In Pettersson H (ed.) : The NICER CENTENNIAL BOOK 1995 A Global Textbook of Radiology, Oslo, Norway. Vol. II, pp. 1111-1216.
2. Cecil Essentials of Medicine 1986, WB Saunders Co. Philadelphia.
3. Davidson's Principles and Practice of Medicine 15th ed. 1987 ELBS/Churchill Livingstone, Edinburgh.

LINGUAL THYROID RESEMBLES TONSILLITIS

Md. Murshed ALI [1], M.A. ZAMAN [2], M.A. TAHER [3]

A female baby aged about seven years came to an ENT specialist with difficulty in swallowing, pain in throat and fever following trauma by a fish-bone in the back of tongue.

Her temperature was 101^{0}F pulse-84/min, there was reddish swelling at the back of the tongue, including the tonsillar fossa. She was treated by the specialist conservatively elsewhere and inflammatory symptoms were relieved. Then decision was taken for adenotonsillectomy.Before operative treatment she went to another ENT specialist for a second opinion. After keenly examined, a small rounded, reddish swelling was detected at the back of the tongue and clinically diagnosed as ectopic thyroid (Lingual) by the second specialist. The patient was referred to the Center For Nuclear Medicine and Ultrasound, Rangpur for radioisotope scanning. The diagnosis was confirmed by radioisotope scanning.

Injecting I/V 1mCi Tc ^{99m}, no radiotracer were visualized in the neck region but increased concentration of tracer at the base of the tongue which later was confirmed by lateral view and the case was finally diagnosed as lingual thyroid. (Fig.1)

Thyroid hormones were estimated and found to be euthyroid. Values were T_3 = 2.43 nmol/L, T_4 = 112 nmol/L, TSH = 2.73 nmol/L.

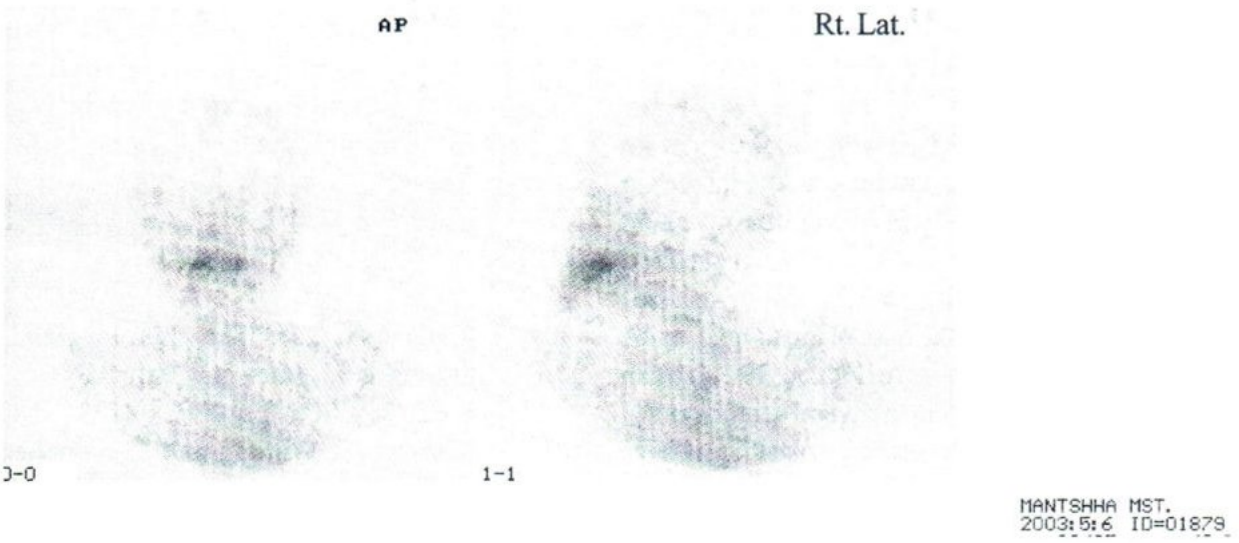

Fig. 1 Lingual thyroid.

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INTRODUCTION

The thyroid glands develops from the median bud of the pharynx which passed from the foramen caecum at the base of the tongue to the isthmus of the thyroid. Some residual thyroid tissue along the course of the thyroglossal tract is not uncommon and may be lingual, cervical, or intra-thoracic. Very rarely the whole gland is ectopic.[1]

Lingual thyroid is a rounded swelling at the back of tongue at the foramen caecum, and it may represent the only thyroid tissue presented. When thyroid tissue occurs other than at the normal anatomical position, it may constitute a diagnostic or therapeutic problem. Most common ectopic form is the lingual thyroid, resulting from failure or incomplete descent of thyroid gland from its original embryological mid-line position at the back of the tongue.

DISCUSSION

The correct management of thyroid diseases depends on accurate diagnosis, appropriate management and careful monitoring. Radionuclide scan have always played a leading part in all aspects of the management of thyroid diseases and radionuclide scanning has long been the main method of investigating the thyroid in vivo.[2]

Lingual thyroid is an abnormal formation appearing as the result of a deficient descent during embryological development of the thyroid gland through the thyroglossal duct to its normal pretracheal location. The lesion consists of a tumor mass of thyroid tissue located at the base of the tongue, in the region of the foramen caecum linguae. The size can vary from a few millimeters to several centimeters in diameter. More than 400 cases of lingual thyroid have been documented in the literature to date.[3]

The ectopic thyroid (Lingual) usually present as a mid-line swelling at the back of the tongue or upper neck or as a nodular goiter[7] or as congenital hypothyroidism. Failure to recognize and diagnose a lingual thyroid swelling may lead to inadverent excision and permanent hypothyroidism requiring life-long thyroid replacement.

The case presented with symptoms resembling tonsillitis i.e. painful dysphagia, fever and congestion of whole pharynx and after antibiotic treatment only the swelling at the base of the tongue persisted which was finally diagnosed as lingual thyroid by radioisotope scanning.

It was reported that, occasionally lingual thyroid resembling the neoplasm of the base of tongue.[4]

Rarely hyperthyroidism and malignancies were reported in lingual thyroid.[5,6]

So it may be concluded that, any mid-line swelling at the back of the tongue should therefore always be investigated for the possibility of an ectopic thyroid before biopsy or excision as they may resemble tonsillitis, neoplasm of back of the tongue or cyst and presence or absence of a normally situated thyroid gland should also be confirmed by radioisotope scanning to avoid iatrogenic hypothyroidism and make the patient life long thyroxin dependent.

REFERENCES

1. Krukowshi ZH. The thyroid gland and thyroglossal tract. In Short Practice of Surgery, 23th Edition, RCG Russell, Norman S, William and Christopher JK; Oxford University Press Inc. New York. 1997 : pp : 707-733.

2. Maisey Mn. Thyroid. In : Clinical Nuclear Midicine, 3rd edition. Editor, Maisey MN, Britton KE, Collier BD ; Chapman and Hall Medical, Tokyo : 1998 ; pp : 331-381.
3. Quarracino MC, aguas SC : Lingual Thyroid : A clinical case. med Oral 2003 Jan-Feb ; 8 (1) : 57-60
4. Boer A, Polus K ; Lingual thyroid : a rare disease resembling base of tongue neoplasm : Magy Onkol 2002 ; 46 (4) : 347-9

CASE REPORT : DOUBLE GALL BLADDERS WITH CHOLELITHIASIS

Md. Mushed Ali. MBBS ; M-Phil (NM).

A young men aged about 27 years referred for ultrasonography of the upper abdomen having a history of colicky pain in the right upper abdomen for the last three days associated with vomitting. Previously he had several attacks of the same nature. On general physical examination, tenderness was present in the right upper abdomen, with a little elevation of temperature, pulse 84/min and blood pressure was 130/75 mm Hg.

Ultrasound scan was done previously elsewhere and the case was diagnosed as choledocholithiasis with extrahepatic biliary dilatation.

In the ultrasonogram, we found that there were two gall bladders clearly separated from each other, one was normal in size and shape, another one was a bit smaller ; both of them were extrahepatic. There were multiple small bright structures casting shadows in the smaller one and the walls of these gall bladder were thickened. There were no intra or extrahepatic biliary dilatation, and the case was diagnosed as double gall bladder with cholelithiasis. The diagnosis was confirmed by laparotomy, during laparotomy it was found that there were two gall bladders, both were in the gall bladder fossa, having each a separated cystic duct. Cholecystectomy was done (Both gall bladders were removed).

INTRODUCTION

The double gallbladder, a rare congenital anomaly, is important in clinical practice because it may cause some clinical, surgical, and diagnostic problems.

A case of double gall bladders is usually diagnosed by preoperative ultrasonography.

DISCUSSION

A case of symptomatic cholelithiasis in a double gallbladder, diagnosed by preoperative ultrasound scan, was reported.

The double gallbladder is a congenital anomaly of rare preoperative diagnostic finding, which could be presented in an asymptomatic or symptomatic form. They becomes clinically manifested through repeated biliary colics. The preoperative diagnostic procedures did reveal the malformation, and the presence of lithiasis in one of the gallbladders but did not detect for an anomalous insertion of the cystic duct, bile duct. Either one, or both lobes, of the double gall bladder, may be diseased. Another author report a patient in whom the two lobes were affected by different disease processes, namely, cholesterosis, and cholelithiasis with mucocele.[1]

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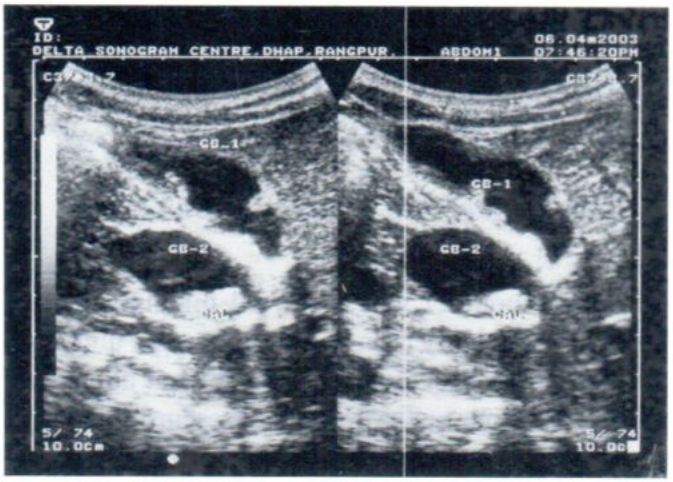

Case Report : Double Gall Bladders with Cholelithiasis

The double gallbladder and the accessory gallblsdder are rare congenital anatomical variations, but important due to an increased risk of gallstones and biliary tree malformations. Most cases have been diagnosed incidentally during surgery.[2]

We emphasize that if a case is diagnosed or suspected preoperatively as double gall bladder by ultrasound scan than a careful intraoperative cholangiographic evaluation of the accessory gallbladder is mandatory in order to prevent inadvertent injury to bile ducts,since a large variety of ductal abnormality may exist.[3]

It can be concluded that the valuable information obtained by proper ultrasound can reduce the unnecessary delay of the management, there by relieving the patient form many morbid conditions.

Although there are different modalities for detection of double gall bladder namely USG, OCG, CT, MRI but most agree that USG should be used as first means of study, since early CT, MRI are also sensitive but invasive, hazardous and expensive.

ACKNOWLEDGEMENT

I shall remain evergrateful to Dr.S.M.A. Tabel. MBBS; FCPS(Surgery), Asstt.professor of Department of Surgery, Rangpur Medical College Hospital for his kind cooperation.

REFERRECE

1. Gautam A, Kala S. Kumar M, Sharma CL. In : Double gall bladder with two disease processes. Indian J Gastroenterol 1999 Oct-Nov;18(4): 179
2. Marin-Pineda R, Arnaud-Carreno C, Leyva-Ramos A, Marin-Dominguez R. In: Accessory gallbladder. Diagnosis by ERCP. Rev Gastroenterol Mex 2002 Apr-Jun; 67(2):100-2
3. Gorecki PJ, Andrei VE, Musacchio T, Schein M. In: Double gallbladder originating form left hepatic duct: a case report and review of literature. JSLS 1998 Oct-Dec;2(4):337-9

SONOGRAPHY OF GALL BLADDER PERFORATION

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OBJECTIVE : To describe the sonographic signs of gall bladder perforation.
METHOD : Three patients had a diagnosis of gall bladder perforation based on abdominal sonography.
RESULT : All 3 patients had similar sonographic features of gall bladder perforation and had surgical confirmation.
CONCLUSIONS : Abdominal ultrasound may reveal important findings, which may have clinical implications in gall bladder perforation which is very rare and difficult to manage.

Key words : Ultrasonography, gall bladder perforation.

Gall bladder perforation following acute cholecystitis is a rare phenomenon[1] and often followed by a vague and insidious cilinical course. Since 1981, we have seen about 37000 patients and encountered 2 cases of double gall bladder [2] and only three cases of gall bladder perforation,two of them resulted in cholecysto-enteric fistula as confirmed by ultrasonography (USG) and surgery which resolved spontaneously.

CASE REPORTS

CASE 1

A 46 year-old woman with acute abdominal pain was referred for USG. The sonogram showed irregular thickening of the gall bladder wall with associated complex pericholecystic and perihepatic fluid and communication with adjacent bowel loop.Focal loss of reflectivity of the gall bladder was also noted consistent with gall bladder wall disruption. The patient was managed conservatively and was scheduled for interval cholecystectomy.

CASE 2

A man of age 65 years came with acute abdominal pain for ultrasonography. Findings were highly reflective lumen of gall bladder with calculus and poor lumen contour. There was adhesion in the neck with surounding structures. Common bile duct (CBD) was dilated (12 mm) with stone in distal part. Laparoscopic cholecystectomy showed gallstone and fistula of gall bladder with duodenum.Spontaneous healing was observed but CBD calculus could not be taken out. Later on, endoscopic retrograde cholangiopancreatography (ERCP) was done after 1 month, stone was crushed and fragments were brought out but not all. Papillectomy was also done.

CASE 3

A man aged about 57 years were referred for ultrasonography, having a history of severe abdominal pain, fever and vomiting for the last 10 days. On clinical examination, abdomen was distended with diffuse abdominal tenderness, more in the right hypochondriac region. Pulse and blood pressure were normal. Previously ultrasound was performed elsewhere and the case was diagnosed as soft tissue mass in the gall bladder with cholelithiasis. In ultrasound scan,we found moderate amount of free echogenic fluid collection in the peritoneal cavity. Liver was enlarged in size, but uniform in echotype.

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Gall bladder was distorted in size and shape, lumen was almost obliterated,echo bladder fossa which was clearly separated from the right kidney and the gut. The case was diagnosed as perforation of gallbladder associated with sub-hepatic abscess and pyoperitoneum, which was confirmed by laparotomy. During laparotomy, after exploration of peritoneum it was found that the peritoneal cavity was filled with pus, and localized collection beneath the liver(right lobe). Gall bladder was found to be ruptured with multiple stones of various sizes in it as well as in the peritoneal cavity. After cholecystectomy, peritoneal toileting was done and the gall bladder tissue was sent for histopathologic examination. No malignancy was found, however, there were some inflammatory changes in the gall bladder.

DISCUSSION

Gall bladder perforation(also referred to as lacerations or ruptures) occur secondary to acute cholecystitis, infection, trauma or malignancy. It is five time more common in emphysematous cholecystitis than gallstone-induced cholecystitis. Emphysematous cholecystitis is an unusual variety of acute cholecystitis and 20-30% of cases will occur in diabetics and many will not have gallstones.[3,4] Sonography, cholescintigraphy(hepatobiliary scan), and computed tomography along with a high index of suggestion are useful for early diagnosis of gall bladder perforation. Sonographic findings include a complex echogenic pericholecystic fluid collection, a thickened hypoechoic edematous gall bladder wall, a collapsed gall bladder lumen despite prolonged fasting and disruption of the gall bladder wall with focal loss of its reflectivity.[5,6] The treatment of choice for gall bladder perforation is cholecystectomy. Alternative treatments include biliary stent placement and conservative treatment. Swayne and Filippone retrospectively analyzed the cholescintigrams and sonograms of 36 consecutive patients with gall bladder perforation and concluded that although cholescintigraphy appears superior to sonography, both modalities are relatively insensitive for the detection of gall bladder perforation.[7-9] In 1934, Niemeir [10] proposed a classification of gall bladder perforation which was modified subsequently [11] : Type I perforation(acute free intraperitoneal spill) accounts for 31-37% of all cases ; Type II perforation (subacute local perforation with pericholecystic abscess formation) comprises 39-57% of all cases ; and Type III perforation (chronic cholecystoenteric fistula formation) accounts for the remaining 6-29%.[10-13] Abu-Dalu and Urca [14] reported a 52% cystic duct patency rate at surgery in their series of patients with type I gall bladder perforations. Type II gall bladder perforations are the most common type seen at surgery since acute perforations tend to become walled-off quickly by inflammatory adhesions. Pericholecystic fluid is a sonographic sign of gall bladder perforation [6,15] ; however it is not pathognomonic of perforation and is also seen in ascites, intraperitoneal hemorrhage, liver abscess, peritonitis, peptic ulcer and pancreatitis.[6] Thickening of the gall bladder wall is another relatively nonspecific finding in acute cholecystitis (43% to 72% sensitivity) and gall bladder perforation (43-64%). Sonographic Murphy sign is a useful adjunct with a sensitivity of 72% in acute cholecystitis,[16] the sensitivity is lower (33%) in gangrenous cholecystitis.[17]

ACKNOWLEDGEMENTS

We are grateful to Dr. Salima Rahman in case 1, Dr. Rafiqus Salehin in case 2 and Dr. M.A. Quayum, (Surgery) in case 3 for the operative findings.

REFERENCES

1. Kao EY, Desser TS, Jeffrey RB. Sonographic diagnosis of traumatic gall bladder rupture. J Ultrasound Med 2002 ; 21 : 1295--1297
2. Taher MA. Double gall bladder : case reports. ASEAN J Radiol 2001 ; VII : 189-190.
3. Mentzer RM, Golden GT, Chandler JG, Horslry JS. A comparative appraisal of emphysematous cholecystitis. Am J surg 1975 ; 124 : 10-15.

4. Gabriel HJ. The perforated gall bladder in sonography. Ultraschall Med 1984 ; 5 : 122-125.
5. Kim PN, Lee KS, Kim IY, Bae WK, Lee BH. Gall bladder perforation : comparison of US finding with CT. Abdom Imaging 1994 ; 19 : 239-242.
6. Siskind BN, Hawkins HB, Cinti DC, Zeman RK, Burrell MI, Gall bladder perforation : an imaging analysis. J Clin Gastroenterol 1987 ; 9 : 670-678.
7. Swayne LC, Filippone A. Gall bladder perforation : correlation of cholescintigraphic and sonographic findings with the Niemeier classification. J Nucl Med 1990 ; 31 : 1915-1920.
8. Joseph AEA, Grundy A. Diseases of the gall bladder. In Wilkins RA, Nunnerly HB (eds.) : Imaging of the liver, pancreas and spleen. 1990 Oxford, Blackwell. pp. 309-321.
9. Middleton WD. Gall bladder. In Goldberg BB (ed.) : Textbook of Abdominal Ultrasound. 1993, Baltimore, Williams & Wilkins. pp. 116-145.
10. Niemeier OW. Acute perforation of the gall bladder. Ann Surg 1934 ; 99 : 922-924.
11. Roslyn J, Busuttil RW. Perforation of the gall bladder : a frequently mismanaged condition. Am J Surg 1979 ; 137 : 307-312.
12. Felice PR, Trowbridge PE, Ferrara JJ. Evolving changes in the pathogenesis and treatment of perforated gall bladder. Am J Surg 1985 ; 149 : 466-473.
13. Roslyn JJ, Thompson JE Jr, Darvin H, DenBesten L. Risk factors for gall bladder perforation. Am J Gastroenterol 1987 ; 82 : 636-640.
14. Abu-Dalu J, Urca I. Acute cholecystitis with perforation into the peritoneal cavity. Arch Surg 1971 ; 102 : 108-110.
15. Madrazo BL, Francis I, Hricak H, Sandler MA, Hudak S, Gitschlag K. Sonographic findings of perforation of the gall bladder. AJR 1982 ; 139 : 491-496.
16. Ralls PW, Colletti PM, Lapin SA, et al. Real-time sonography in suspected acute cholecystitis : prospective evaluation of primary and secondary signs. Radiology 1985 ; 155 : 767-771.
17. Simeone JF, Brink JA, Mueller PR, et al. The sonographic diagnosis of acute gangrenous cholecystitis : importance of the Murphy sign. AJR 1989 ; 152 : 289-290.

UTILITY OF CLOMIPHENE THERAPY IN OLIGOSPERMIA

M A TAHER

Male infertility is very rare but offen not identified and remain maltreated. We found a case of oligospermia, which was cured by clomiphene therapy.

CASE REPORT

A couple came to our centre for primary infertility--they were married 3 years ago. Abdominal ultrasonography (USG) and thyroid function tests were normal but the husband had low sperm count (25 million/ml of semen). He was prescribed clomiphene citrate 25 mg/day for 1 month--his sperm counts was increased and he fathered a daughter.

DISCUSSION

Among the male factors, obstructive azoospermia is found in 14.1% and oligoasthenozoospermia in 21.2% patients in a recent study.[1] Clomiphene citrate is indicated in anovulatory infertility, amenorrhea, oligomenorrhea with anovulatory cycles, and oligospermia.[2] It is a nonsteroidal weak androgen which acts as an estrogen receptor blocker in the hypothalamus. Most of the feedback control at the level of the hypothalamus is mediated by peripherally or locally formed estradiol. Chomiphene leads to an increase in GnRH (gonadotropin releasing hormone) release and subsequently to LH and FSH release. To perform clomiphene stimulation test, 50-100 mg of clomiphene is given twice daily for ten days. Pooled samples of blood are taken and plasma LH and FSH are measured prior to clomiphene administration and on days 9 and 10. A 50-250% increase in LH and a 30-200% increase in FSH and a 30-220% increase in testosterone on day 10 of the test is a normal response. As a treatment of male infertility clomiphene citrate is used 100 mg 3 times weekly or 25 mg daily for the first 25 days of each month. Pregnancy rates of about 30% have been reported.[3]

REFERENCES

1. Fatima P, Hossain M M, Fatema N, Rahman D, Momtaz H. Assisted reproductive technologies (A R T) : A new approach in Bangladesh. Orion 2003 ; 14 : 35-36.
2. MIMS Bangladesh. 2000 ; 2 (2) : 82.
3. Sharlip I D. Male reproductive disorders. In Fitzgerald PA (ed.) : Handbook of Clinical Endocrinology. 1986 california, Jones Med. Pub. pp. 249-288.

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ELEVEN YEARS FOLLOW-UP OF RENAL HYDATID CYST

Dr. M.A. Taher

Renal hydatid cyst is rare in Bangladesh.Therefore,we like to report a case of renal hydatidosis followed up for eleven years.

CASE REPORT

A 48 year-old Muslim male coming from Nilphamari district presented at NMC Dinajpur with pain and progrssively enlarging lump in left loin of about 6 months duration since December 1991. The lump was taken note of because of heaviness in the left abdomen.There was no urinary or bowel disturbance.

EXAMINATION

His pulse was 84/min and BP was 138/95 mmHg. A lump of 20x16cm size located in left hypochondrium to lumbar region,with well-defined margins,smooth surface and variable consistency was felt,which was bimanually palpable.Chest revealed nothing abnormal and all the other systems were normal clinically.

INVESTIGATIONS

Ultrasonography (USG) revealed a huge multicystic left kidney. It was functioning poorly as shown by hippuran (I-131) renogram and DTPA (Tc-99m) renal scan.

MANAGEMENT

After exploration,partial nephrectomy was done on 23 July 1992 to remove the hydatid cysts. The patient was put on a long course of mebendazole (720 tablets of 100 mg).

FOLLOW-UPS

The patient was symptom-free for many months.Post-operative scan on 21 January 1993 showed a small left kidney with uniform concentration of DTPA. On 10 July 1995 he presented at NMC Rangpur with recurrence of symptoms.A multiloculated cyst was seen by sonography in the left loin,DTPA renal scan showed a normal right kidney and poorly visualised left kidney. The patient could not afford a repeated surgery, received albendazole 800 mg/day orally for 15 days and improved considerably.He refused further treatment, but came again on 30 May 2002 with a lump in the left loin. The patient gave a history of occasional albendazole therapy (400 mg daily for 2 weeks) USG showed that the lump was a multiloculated cyst of 120X153 mm in size. The patient was given albendazole 800 mg twice daily for 15 (fifteen) days. He was improved and USG on 19 August 2002 showed further reduction of the size of lump (98X115 mm). On January 22,2003,he was clinically well and USG showed no cyst. Although we have no laboratory proof, but we assumed from therapeutic success that it was a recurrence of echinococcosis.

DISCUSSION

Echinococcal infection in adults are mostly in the liver (54-77)%.Pulmonary hydatidosis (9-30%) ranks second to the liver.Hydatid cysts are commonly found in the liver and cause compression of liver cells

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which can lead to biliary stasis and cholangitis due to secondary infection. Lung cysts are more spherical than those in the liver and their rupture can result in hemoptysis from bursting of pulmonary capillaries. The small percentage of organisms that escape liver and lung may enter the systemic circulation and infest different organs [e.g. heart, kidney, orbit, breast, skeletal muscles,spleen, thyroid gland (0.1%), urinary bladder] and none has escaped from being infested.[1-11] In sheep-raising districts, hydatid cyst of the kidney is common, occasionally the patient complains of passing "grapeskin" (ruptured daughter cysts) in the urine,[12] but renal hydatid cyst is rare in Bangladesh and therefore we like to report the present case. Patients with recurrent hydatid cysts (or poly-cystic disease) are often treated by mebendazole or albendazole or percutaneous treatment. Ultrasono-graphy is a useful way to monitor the progresses. Bezzi et al.[13] followed 141 abdominal hydatid cysts (108 in the liver) in 63 patients treated by these drugs, however, 40% remained sonographically unaltered.[13] Radionuclide studies may help in these situations. Ultrasound findings in hydatid cyst may be pure fluid collection, split wall, septa, heterogeneous echo or reflecting thick walls.[14] Mebendazole(40-50 mg/kg/day) for at least 3 months or more effectively albendazole 10-15 mg/kg/day in several monthly courses separated by intervals of 14 days[15] has been used for inoperable hydatid disease and to reduce the infestivity of cysts preoperatively. Double percu-taneous aspiration and ethanol injection(D-PAI) of hydatid cyst is an effective treatment, but there is a risk of anaphylactic shock, occasionally fatal--two deaths were reported by Giorgio et al. and Men et al.,[16-18] although they used mebendazole(3 g/d) or albendazole(800 mg/d) 1 week before and 3 weeks after D-PAI and betamethasone(12 mg/d IV) as prophylaxis for allergic reactions for 3 days before and 2 days after each D-PAI session.

REFERENCES

1. Taher M. A. Renal hydatid cyst. J Indian Med Assoc 95 : 196,1997.
2. Makki H, Renal hydatid disease. Br. J. Surg 54 : 265-91, 1967.
3. Halim A, Vaezzadeh K. Hydatid disease of the urinary tract. Br J Urol. 52 : 75-8, 1980.
4. Von Sinner WN, Hellstrom M, Kagevi I, Norlen BJ. Hydatid disease of urinary tract. J Urol. 149 : 577-80, 1993.
5. Thomas A, Bhat. S, Jacob AJ. Echinococcal disease of the kidney. A case report. JIMA 94(5) : 178, 1996.
6. Singh S, Griwan MS, Kalra U, Dua R, Singh S. Retrovesical Hydatid cyst JIMA 94(5) : 178, 1996.
7. Przybojewski JS. Primary cardiac hydatid disease. S Afr Med. J 65(11) : 438-442, 1986.
8. Deodhar SD et al. Hydatid disease of the urinary bladder. J Postgrad Med 32(1) 46 -48, 1986.
9. Benini P et al. A case of recurrent Echino coccus of the muscle. Minerva Chir. 37(9) : 845-852,1982.
10. Gogeri B, Punekar RAA, Khan WA. Hydatid disease : A case report. Bangladesh Med. J 19 : 131-132, 1990.
11. Franquet T, Montes M, Lecumberri FJ, Esparza J, Bescos JM. Hydatid disease of the spleen : imaging findings in nine patients. AJR 1990 ; 154 : 525-8.
12. Rains AIH, Mann CV (Revised)-Bailey & Love's A short practice of surgery. 20th edn. 1988 ELBS/H.K. Lewis, London.
13. Bezzi M, Teggi A, De Rosa F, Capozzi A, Tusa G,Bonifacino A,Angelini L. Abdominal hydatid disease : US findings during medical treatment. Radiology 162, 91-95, 1987.
14. Chehida FB, Gharbi HA, Hammou A. Bellagha I, Amor NB, Gargouri M. Ultra-sound findings in hydatid cyst. Ultrasound Quarterly 15 : 216-222, 1999.
15. Filice C, Branetti E, Crippa F, Bruno R, Treatment of Echinococcal Abdominal cysts. Ultrasound Quarterly 15 : 223-233, 1999.

16. Giorgio A, Tarantino L, de Stefano G, Francica G, Esposito F, Perrotta A, Aloisio V, Farella N, Mariniello N, Coppola C, Caturelli E. Complications after interventional sonography of focal liver lesions : A 22-year single-center experience. J Ultrasound Med 2003 ; 22 : 193-205.

17. Men S, Hekimoglu B, Yucesoy C, at al. Percutaneous treatment of hepatic hydatid cysts : an alternative to surgery. AJR Am J Roentgenol 1999 ; 172 : 83-89.

18. Bastid C, Azar C, Doyer M, Samel J. Percutaneous traetment of hydatid cysts under sonographic guidance. Dig Dis Sci 1994 ; 39 : 1576-1580.

FATAL BREAST SARCOMA

M A TAHER [1], M. SAADUDDIN JAIGIRDER [2]

In our country, many patients with breast lumps are neglected. A woman of 45 years came with a fungating lump in right breast initially treated by homeopaths in 1998 and later operated twice in April 2000 and August 2000 (Biopsy : cystosarcoma of right breast). The patient was sent to Mumbai (November 2000), but no radiotherapy/chemotherapy was given there. The patient was asymptomatic during the whole of 2001, chest X-ray showed opacity in upper zone of right lung. She complained bone pain in January 2002, isotope bone scan (99m Technetium phosphonate) revealed multifocal bony lesions. Radiotherapy with cobalt-60 was started in January 2002. On 3 February 2002, she suffered pertrochanteric fracture of left femur. Her ECG report showed gross abnormality which restricted chemotherapy in full dose. She was treated with traction, telecobalt radiotherapy on the right lung, lumbar spine and left femur. In addition, she received chemotherapy of FU (5 fluorouracil), Endoxan (Cyclophosphamide) and lastly single agent Holoxan (ifosfamide) with Mesna (uroprotector). She needed occasional oxygen inhalation till 15 April 2002. She had multiple cutaneous metastases on the right chest in May 2002 which was also irradiated but she died on 19 May 2002.

DISCUSSION

Non-epithelial neoplasms of breast like sarcomas of various types e.g. fibrosarcoma, leiomyosarcoma, angiosarcoma,-all are extremely rare. Prognosis of these tumors are very poor. Widespread dissemination cause rapid death unless treated at a very early stage. Sarcomatous changes in a soft tissue fibroadenoma account for more than half of the cases of sarcoma of the breast. Mean age of incidence is 48 years. A history of swelling, which is present for months or years,and has recently enlarged rapidly, is frequently obtained. On examination, a large prominent swelling with dilated subcutaneous veins and without retraction of the nipple is observed. It is of unequal consistency, parts of it being hard, parts being soft and parts fluctuating, due to cystic degeneration or haemorrhage. Only in the late stages does the skin become adherent (without being infiltrated) or fungation occur. Lymph nodes are not involved until very late.[1] About 25% of breast sarcoma recur locally. In case of recurrence,it may be aggressive and distant metastases may also occur.[2-6]

REFERENCES

1. Das S. A Manual on Clinical Sugery, Calcutta 1986.
2. Hajdu SI et al. 1976 Cancer 38 : 1402-6.
3. Hart WR et al. 1978 Am J Cl Path 70 : 211
4. Liberman L et al. 1996 Radiology 198 : 121-4.
5. Cutuli B et al. 1997 Eur J Cancer 33: 2315-2320
6. Fisher et al. Neoplasm of Breast. In Cancer Medicine P1710, 3rd Edition 1993. Lea & Febiger, Philadelphia.

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INCIDENCE OF GESTATIONAL TROPHOBLASTIC DISEASE IN RANGPUR, BANGLADESH

Dr M A Taher

ABSTRACT

OBJECTIVE : To find out the incidence of hydatidiform mole in Rangpur, Northwest region of Bangladesh.

METHODS : We performed obstetric ultrasonography amongst 519 pregnant women in Rangpur during July 2001 to April 2002. We used 3.5 Mega-Hertz frequency linear/ curvilinear transducers of: Siemens sonoline SL 2, Fukuda 3500, Pie Medical 480/485 Scanners. Histopathology and hormone assays were done in selected cases.

RESULTS : We found 11 csses of vesicular mole among this series which is quite high (1 in 47 pregnancies), as in Caucasians it is very low e. g. 1 in 3000, in U.S.A. it is 1 in 1200 to 2000, in France 1 in 500, in some Indonesian hospital more than 1 in 100 pregnancies.

CONCLUSIONS : Sonography is a cheap and safe initial screening test for gestational trophoblastic diseases.

WFUMB 2003 Abstract ID # 21662
Key words : Gestational trophoblastic disease (GTD), Hydatidiform mole, choriocarcinoma.

INTRODUCTION

The present study attempts to determine the incidence of gestational trophoblastic disease in our region, using all available techniques and compared with other regions.

METHODS

We performed obstetric ultrasonography amongst 519 pregnant women in Rangpur during July 2001 to April 2002. We used 3.5 Mega-Hertz frequency linear/ curvilinear transducers of Siemens sonoline SL 2, Fukuda 3500, Pie Medical 480/485 Scanners. Histopathology, radionuclide brain scans and homone assays were done in selected cases. Diagnosis was made by typical echoes of vesicles,- snowstorm or honeycomb appearance (Fig 1).

RESULTS

Total 519 subjects were studied of which 11 (n=11, 2.1%) were found to be hydatidiform mole (Table-1). All these cases were correlated with beta HCG evaluations and histopathology

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confirmed hydatidiform mole. Typical ultrasound features of hydatidiform mole were seen in 9 (n=9, 81.9 %) cases. One case had sonographic appearance of incomplete abortion (n=1, 9.1 %). Another case had invasion in myometrium (n=1, 9.1 %).

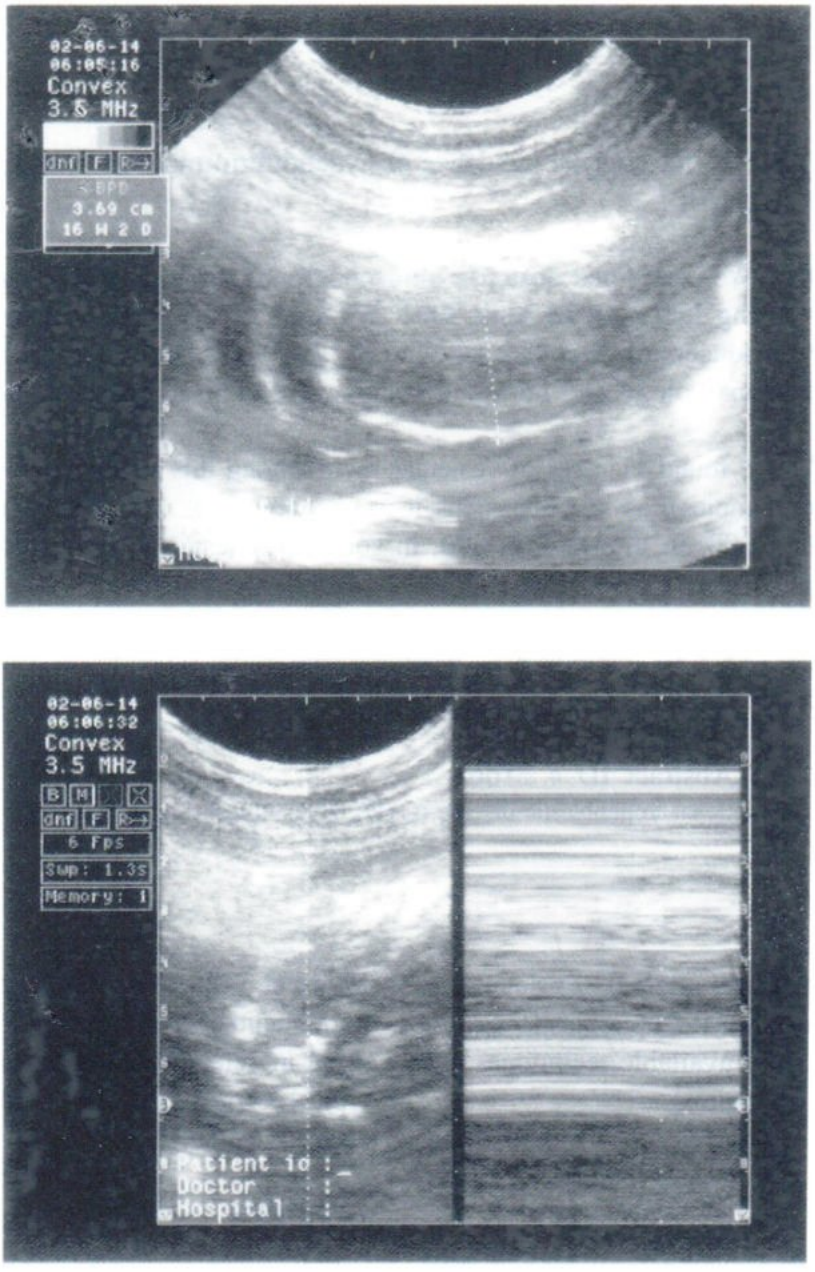

Fig. 1 Partial mole, 16 weeks.

DISCUSSION

Gestational trophoblasstic disease comprises of a spectrum of disorders from the benign hydatidiform mole (complete and partial) through the malignant invasive mole, choriocarcinoma, and the rare placental site/epithelioid trophoblastic tumour.[1] Characteristically, a hydatidiform mole appears as a large, moderately echogenic, soft tissue mass filling the uterine cavity. Numerous small cystic fluid-containing spaces are scattered throughout. When the tumour volume is small, the myometrium may be perceived as less echogenic soft tissue surrounding the more eqhogenic mass filling the uterine cavity. Although these features have come to be recognized as typical of a hydatidiform mole, this appearance is only specific for a second trimester mole. First trimester moles, in some cases, may have an appearance simulating a blighted ovum or a threatened abortion ; others may show a small echogenic mass filling the uterine cavity without the characteristic vesicular appearance. In these cases, only a high index of suspicion to correlation with the level of HCG will allow the sonographer to suggest the correct diagnosis. Incidence of hydatidiform mole varies geographically (Table-2), but those women who are at the end of their reproductive years have an increased incidence of trophoblastic disease despite of race or geography.[2] Bracken states that, reports of a very high incidence of GTD in Asia, Africa & South Central America may have been exaggera- ted due primarily to selection bias in the patients studied at University Hospitals.[3] In Hawaii,complete hydatidiform moles (CM) occur in about 1/100 pregnancies and partial hydatidiform moles partial hydatidiform moles (PM) in 3/1000 pregnancies.[4] They can be distinguished histologically and genetically ; CMs are diploid and nearly always androgenetic in origin, whereas partial hydatidiform moles (PM) are triploid consisting of one maternal and two paternal sets of chromosomes.[5] Tumours of trophoblastic origin (choriocarcinoma or hydatidiform mole or testicular embryonal carcinoma) may secrete huge quantities of HCG which has mild TSH-like activity.[6] The associated hyperthyroidism is usually mild (2%), with small goitres. Treatment consists of betablocker and removal of choriocarcinoma or mole (6%). The response of choriocarcinoma to methotrexate or actinomycin therapy may be dramatic. Complete remission for over 10 years have been observed.[7] Partial hydatidiform moles (PM) can transform into choriocarcinoma. Seckl and colleagues reported 3000 patients with PM, 15 of which required chemotherapy (including prophylactic intrathecal methotrexate).[8-9] In Mymensingh (Bangladesh), most of the molar pregnancies (60%) presented with 15-20 weeks of amenorrhea,[12] but in our series 7/11 or 63% patients presented in 1st trimester. (Table-1) Sonography is a cheap and safe initial screening test for gestational trophoblastic diseases.[13,14] The majority of first trimester complete moles demonstrate a typical ultrasound appearance such that the diagnosis can be made with sonography in most cases.[15] In Japan, the incidence of hydatidiform mole (HM) has been gradually decreasing, in 1974 it was 4.9 per one million population, and that of choriocarcinoma per ten millions of population was 1.6, but in 1993, the incidence of HM was 1.9 and that of choriocarcinoma was 0.3.[16] In Korea, the hospital-based incidence of HM per 1000 deliveries from 40.2 during 1971 -75 to 2.3 during 1991-95.[17] But it has increased in Vietnam in the past decade.[18] paradinas states that the introduction and widespread acceptance of the term partial mole (PM) in 1977, coincided with improvements in ultrasound which brought forward 6 weeks the average time of evacuation of complete moles (CM), when hydrops is not yet complete but partial and when vessels are present in most CMs, leading to erroneous diagnosis of PM.[19] The risk of post-molar gestational trophoblastic tumor (GTT) is approxi-

mately 20% in young women,[20] the risk is increased in women over 35 years[21,22] and is reported as high as 56% in women over 50 years.[23] Early ultrasound diagnosis of a non-embryonic or a blighted ovum may not rule out the presence of abnormal trophoblast associated with hydatidiform mole.[24] Most of the inhabitants of Rangpur are iodine-deficient and chew tobacco as it is grown here abundantly and it is grown here abundantly and it may play a role in high incidence of molar pregnancy, as a study in Denmark showed that smoking tobacco promotes thyroid enlargement and this is exacerbated by iodine deficiency.[25]

CONCLUSIONS

Sonography is a cheap and safe initial screening test for gestational trophoblastic disease. The high incidence of molar pregnancy in Rangpur may be related to environmental iodine deficiency, tobacco production and due to the fact that many pregnant women do not get ultrasound facility in the right time.*

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TABLE 1 Cases of hydatidiform mole.

SL NO.	Age (Years)	Amenorrhea (weeks)	Gravida	Major complaint	Uterus in mm
1	28	9	Primi	Vaginal bleeding	76x86x55
2	18	8	Primi	Severe vomiting	69x84x49
3	44	14	3rd	Weakness	103x61x53
4	45	11	3rd	Palpitations	92x66x51
5	42	10	4th	Vaginal bleeding	85x108x62
6	27	15	Primi	Anorexia	118x77x49
7	25	5	Primi	Severe vomiting	103x55x46
8	27	15	2nd	Vaginal bleeding	116x74x61
9	29	6	3rd	Vaginal bleeding	74x84x49
10	35	6	4th	Vaginal bleeding	113x58x71
11	22	14	2nd	Vaginal bleeding	85x107x59

TABLE 2 Geographic distribution of Hydatidiform mole.[8,9]

Country.	Incidence of H. mole.
U.S.A.	1 in 1200 to 2000 pregnancies.
France	1 in 500 "
Far East (Indonesia) (10)	>1 in 100 "
Sao Paulo (Brazil) (11)	1 in 215 "
Mymensingh (12)	1 in 270 "
Rangpur (This series)	1 in 47 "

REFERENCES

1. WHO. Gestational trophoblastic diseases, Technical Report Series 692. Geneva : WHO, 1983 : 7--81
2. Callen PW. Ultrasonography in Obstetrics and Gynaecology 2nd ed. 1988 WB Saunders Co. Philadelphia.
3. Bracken MB. Incidence and aetiology of hy datidiform mole : an epidemiological review. Br J Obstet Gynaecol 1987 ; 94 : 1123--4.
4. Jacobs PA, Hunt PA, Matsuura JS, Wilson CC, Szulman AE. Complete and partial hyda tidiform mole in Hawaii : cytogenetics, morphology and eqidemiology. Br J Obstet Gynaecol 1982 ;89 : 258--66.
5. Paradinas FJ, Fisher RA. Pathology and molecular genetics and trophoblastic disease. Curr Obstet Gynaecol 1995 ; 5 : 6--12.
6. Safrit HF. Thyroid Disorders. In Handbook of Clinical Endocrinology (ed) Fitzgerald PA. 1986. Jones Med. Pub. greenbrae, California.
7. Taber's Cyclopedic Medical Dictionary 17th ed. 1993 Jaypee Bros. New Delhi.
8. Seckl MJ, Fisher RA, Salerno G. et al. Choriocarcinoma and partial hydatidiform moles. Lancet 2000 ; 356 :36--39
9. Sand PK, Lurain JR, Brewer JI. Repeat gestational trophoblastic disease. Obstet Gynaecol 1984 ; 63 : 140.
10. Poen HJT, Djojopranoto M. The possible ethiologic factors of hydatidiform mole and choriocarcinoma ; Am J Obstet Gynaecol 1965 ; 92:510.
11. Sun SY, Amed AM, Bertini AM, Camano L. Incidence of hydatidiform mole at the Paulista Medical School. Rev A sso Med Bras 1992 ; 38 : 217--20.
12. Hossain GA, Islam SMM, Mahmood S et al. Incidence of hydatidiform mole in Bangladesh. Bangladesh J ultrasonography 2002 ; 9 : 12--18.
13. Fine C et al. Sonographic diagnosis of partial hydatidiform mole. Obstet Gynaecol 1989 ; 73 : 414--5.
14. Kohorn EI. Molar pregnancy : presentation and diagnosis. Clin Obstet Gynaecol 1984 ; 27 : 181--2.
15. Benson CB, Genant DR, Bernstein MR, Soto-Wright V, Goldstein DP, Berkowitz RS. Sonographic appearance of first trimester complete hydatidiform moles Ultrasound Obstet Gynecol 2000 ; 16 : 188-191.
16. Hando T, Ohno M, Kurose T. Recent aspects of gestational trophoblastic disease in Japan. International J Gyne Obstet (IJGO) 1998 ; 60 suppl. No. 1 : S 76.
17. Kim SJ, Bae SN, Kim JH, Kim CJ, Han KT, Chung JK, Lee JM. Epidemiology and time trends of gestational trophoblastic disease in Korea. IJGO 1998 ; 60 suppl. No. S 33-S 38.
18. Cuong DT. Gestational trophoblastic disease in Vietnam : prevalence, clinical features, management IJGO 1998 ; 60 suppl. No. 1 : S 131.
19. Paradinas FJ. The diagnosis and prognosis of molar pregnancy : the experience of the National referral Centre in London. IJGo 1998;60 suppl. No.1 : S 57- S 64.
20. Curry SL, Hammond CB, Tyrey L, Creasman WT, Parker RT. Hydatidiform mole : diagnosis, management, and long-term follow-up of 347 patients. Obstet Gynecol 1975 ; 45 : 1.
21. Bandy LC, Clarke-Pearson DL, Hammond CB. Malignant potential of gestational trophoblastic disease at the extreme ages of reproductive life. Obstet Gynecol 1984 ; 64 : 395.

22. Bahar AM, El-Ashnehi MS, Senthilselvan A. Hydatidiform mole in the elderly : hysterectomy or evacuation ? Int J Gynecol Obstet 1989 ; 29 : 233.
23. Tsukamoto N, Iwasaka T, Kashimura Y, Uchino H, Kashimura M, Matsuyama T. Gestational trophoblastic disease in woman aged 50 or more. Gynecol Oncol 1985 ; 20 : 53.
24. Zaki ZMS, Bahar AM. Ultrasound appearance of a developing mole. Int J Gynecol Obstet 1996 ; 55: 67-70.
25. Knudsen N, Bulow I, Laurberg P, Ovesen L, Perrild H, Jorgensen T. Association of tobacco smoking with goiter in a low - iodine-intake area. Arch Intern Med 2002; 162: 439-443.

BILATERAL RENAL NEOPLASMS IN GIRL

M.A.TAHER[1], M. REAJUL ISLAM[2]

ABSTRACT

We like to report a case of bilateral nephroblastoma (Wilms' tumer) in a girl of age 2.5 years considering its rarity.It is the only case of bilateral Wilms' tumor seen by us amongst about thirty thousand people examined by ultrasonography (USG) since 1981.

KEY WORDS Kidney mass,ultrasonography (USG), Wilms'tumor, Nephroblastoma.

INTRODUCTION

Nephroblastoma (embryonal carcinosarcoma or Wilms' tumor) is a triphasic,embryonic neoplasm that contains epithelial,blastemal and stromal elements.It is named after Max Wilms,the great German surgeon (1867-1918).It is similar in overall incidence to neuroblastoma and accounts for about 8% of all pediatric neoplasms.

CASE REPORT

A girl of age two and a half years came for ultrasonography (USG) of abdominal lump.She had hematuria and fever for the last 3 months and she was given homeopathic drugs in her home.The lump was detected 2 months before admission.On examination, her body temperature was 101^0 F and her pulse was 102/minute. Chest Xray showed no abnormality. No ascites was found. The lump on the right side was 10.6 x 8.8 cm in size,echogenically irregular and almost wholly replaced the right kidney. The left kidney was 8.1 x 5.8 cm in size with a small (2 x 1.5 cm) area of inhomogeneous echoes. Biopsy revealed Wilms' tumor,but the patient was lost to follow-up.

DISCUSSION

Nephroblastoma is the commonest solid abdominal mass as well as the commonest renal malignancy of childhood.Its peak incidence is between 30 months and 3 years of age; 78% of all cases are detected between 1 and 5 years of age.[1] The tumor is rarely seen in adults -- a review of the literature revealed 33 cases of adult Wilms tumor with the mean age of the patients being 30 years.USG in this group showed a complex mass with a large cystic component to each lesion.[2] In children, a big lesion is noted that it is generally well-defined on USG but inhomogeneous in its echogenicity.[3] Anechoic areas are seen throughout the mass and correspond to areas of hemorrhage and necrosis. On USG, the lesion is similar in appearance to a mesoblastic nephroma but presents in a different age group.[4,5] Wilms tumor in association with horse-shoe kidney has also been reported.[6] Pulmonary metastases are present in over 10% of patients at the time of initial diagnosis. Metastases to liver and to opposite kidney also occur which is confirmed by CT scans.[1] Wilms tumor is radiosensitive and with combination of chemotherapy (vincristine), it can be curative.[7] The main presenting feature is painless,rapidly growing tumour without hematuria. The tumor grows within its capsule pushing the rest of the kidney to one side.

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When the tumor bursts through the capsule into the pelvis hematuria results.So this is an ominous sign and indicates very bad prognosis.About half of the patients suffer from rise of temperature which adds confusion to the diagnosis. On the right side this condition is confused with liver enlargement and on the left side with splenomegaly.Blood-borne metastasis is early and liver is mainly affected.Very rarely bones and brain may be affected.[8] Technetium 99m methylene diphosphonate (Tc-MDP) scan may show bony metastases and uptake in the primary Wilms' tumor.[9] Sty and collegues reported that Wilms' tumor is the commonest neoplasm to show focal area of reduced or absent radiotracer accumulation.[10] Children with Wilms' tumor and receiving treatment with cyclosporine A are at a risk of developing hypertensive encephalopathy.[11] Wilms tumor occurs bilaterally in 5% to 10% of cases.[12]

REFERENCES

1. Kirks DR, Laurin S. Pediatric radiology. In Pettersson H (Ed.) vol.2, Oslo, Norway 1995. The NICER Institute. The NICER Global Textbook of Radiology, pp. 533-609.
2. Kiowmehr F. Cochran ST, Layfield L et al. Wilms' tumor (nephroblastoma) in the adult patient : clinical and radiologic manifestations. AJR 1989 ; 152 : 299-302.
3. Neiman HL.The urinary system. In Goldberg BB (Ed.) : Textbook of Abdominal Ultrasound. Williams & Wilkins, Baltimore 1993, pp.330-388.
4. Jaffe MH, White SJ,Silver TM, et al. Wilms' tumor : ultrasonic features, pathologic correlation and diagnostic pitfalls. Radiology 1981 ; 140 : 147-152.
5. Reiman TAH, Siegel MJ, Shackelford G D. Wilms'tumor in children : abdominal C T and ultrasound evaluation.Radiology 1986 ; 160-501.
6. Gay BB Jr., Dawes RK, Atkinson GO Jr. et al. Wilms' tumor in horse-shoe kidneys : radiologic diagnosis. Radiology 1983 ; 146: 693-697.
7. Davidson's Principles and Practic of Medicine. 15th ed. 1987, ELBS/Churehill Livingstone, Edinburgh.
8. Das S. A Mannual on Clinical Surgery,1986, 13 Old Mayor's Court Calcutta, 700005.
9. Edeling CJ.99m Tc-methylene diphosphonate uptake in a primary Wilms'tumor,Eur J Nucl Med 1983 ; 8 : 30.
10. Sty JR, Babbitt DP, Kin L. Atlas of 99m Tc-MDP renal images in pediatric oncology. Clin Nucl Med 1979 ; 4 : 122-127.
11. Chu WCW. Pediatric oncology patients presenting with acute neurological symptoms 2002. Hong Kong College of Radiologists 10th Annual Scientific Meeting pp.49-51.
12. Marble B, Pater B. Surgical diseases of the urinary tract. In Haller J O, Shkolnik A : Ultrasound in Pediatrics (Clinics in Diagnostic Ultrasound # 8) New York, Churchill Livingstone,1981,pp. 135-164.

UNILATERAL BREAST ENLARGEMENT IN A 7 YEARS GIRL : CASE REPORT

M A TAHER

Recently we found a girl of 7 years who came with her parents for ultrasonography (USG) of the enlarged left breast. No other problem was found in hepatobiliary, urogenital and adrenal regions, mammary skin texture was fairly uniform, highly reflective pattern typically seen in the young breast tissue ; only a small layer of subcutancous fat and no significant retromammary fat was identified, the pectoral muscles stood out clearly in contrast to the strongly reflective breast tissue plate.

Longterm followup was advised and we like to report it as a rare case of isolated thelarche (IT).* Cases of isolated thelarche are usually self-limiting, although 10% may progress to central precocious puberty (CPP).[1] In IT, breast development may be unilateral or bilateral and is not associated with development of the areola.[2] It usually occurs before 2 years of age, before the gonadotropin-estradiol negative feedback mechanism becomes sensitive. No other sign of pubertal progression e.g. height velocity, bone age acceleration and progressive development or appearance of other secondary sex characteristics, are observed. In girls with IT, uterine and ovarian volumes are similar to those of prepubertal girls.[3-6] Ovarian macrocysts (follicles measuring 10-20 mm in diameter) may be found in patients with IT.[6-8] Breast development may regress after several months, as happened in our case.

Unlike CPP, isolated thelarche is not associated with maturation of the hypothalamic-pituitary-gonadal axis.[9]

Timmerman believes that the best way forward in gynecologic is to produce a list of Recommended terms, procedures and definitions of end-points.[10]

(IT) = Isolated thelarche* = the beginning of breast development at the onset of puberty.

REFERENCES

1. Root AW. Precocious puberty. Pediatr Rev 2000 ; 21 : 10-19.
2. O'Dea LSL, Siegel SF, Lee PA. Pubertal disorders : precocious and delayed puberty. In ; Sanfilippo JSS, Muram D, Lee PA, Dewhurst J (eds). Pediatric and Adolescent Gynecology. Philadelphia, PA : WB Saunders Co ; 1994 : 53-76.
3. Griffin IJ, Cole TJ, Duncan KA, Hollman AS, Donaldson MDC. Pelvic ultrasound findings in different forms of sexual precocity. Acta Paediatr 1995 ; 84 : 544-549.

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4. Haber HP, Wollman HA, Ranke MB. Pevic ultrasonography : early differentiation between isolated premature thelarche and central precocious puberty. Eur J Pediatr 1995 ; 154 : 182-186.
5. Blogowska A. Significance of ultrasonographic examinations in diagnostics of premature and normal puberty in girls. Ann Acad Med stetin 1997 ; 43 : 161-180.
6. Buzi F, Pilotta A, Dordoni D, Lombardi A, Zaglio S, Adlard P. Pelvic ultrasonography in normal girls and in girls with pubertal precocity. Acta Pediatr 1998 ; 87 : 1138-1145.
7. Stanhope R, Abdulwahid NA, Adams J, Brook CGD. Studies of gonadotropin pulsatility and pelvic ultrasound examinations distinguish between isolated premature thelarche and central precocious puberty. Eur J Pediatr 1986 ; 145 : 190-194.
8. King LR, Siegel MJ, Solomon AL, Usefulness of ovarian volume and cysts in female isosexual precocious puberty. J Ultrasound Med 1993 ; 12 : 577-581
9. Herter LD, Golendziner E, flores JAM, Moretto M, Di Domenico K, Becker E Jr., Spritzer pm. Ovarian and uterine findings in pelvic sonography. Comparision between prepubertal girls, girls with isolated thelarche, and girls with central precocious puberty. J Ultrasound Med 2002 ; 21 : 1237-1246.
10. Timmerman D. Lack of standardization in gynecological ultrasonography. Ultrasound Obstet Gynecol 2000 ; 16 : 395-398.

TRAUMA SCANS : ULTRASOUND AND RADIONUCLIDE STUDIES

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OBJECTIVE : To report the imaging of trauma patients by ultrasound and radionuclide studies.
METHODS : Ultrasonography and radionuclide scans were performed in six patients after various types of injuries.
RESULTS : In all cases,the imaging studies were useful in clinical management.
CONCLUSIONS : Ultrasound and radionuclide studies should be used in selected cases of trauma patients.

Ultrasonography and nuclear scans are used for many decades to evaluate blunt abdominal trauma,[1-4] e.g. liver,spleen,kidney,uterus etc. Localized impact such as in sports injury (collission with fist,foot,knee or elbow) normally produces injury limited to structures adjacent to the impact.Diffuse impact is most frequently the result of a road traffic accident and is characterized by both widespread impact and deceleration components,causing injury at the points of impact and also remote from these areas.[5] Hepatosplenic scan (185 MBq 99m Tc colloid i.v.) offers a rapid reproducible method of assessment in upper abdominal trauma with less than 2% false negative and 7% false positive results.[6] Hypovolemic shock may cause bone marrow uptake of radio-colloid particles.[7]

MATERIALS AND METHODS.

Six patients were referred to our centre for evaluation of various types of injuries by ultrasound and radionuclide scans (Siemens sonoline 2 and Single head planar gamma camera).

RESULTS

Case 1 :

A boy of age 14 years coming from Kurigram suffered a blunt abdominal trauma.Ultrasound scan (USG) revealed a 3x5 cm semicystic area in the right hepatic lobe.Radio-colloid liver scan (99m Tc tin colloid particles)showed photon-deficient area of the same size in the same location.The patient improved gradually on conservative treatment.

Case 2 :

Following a road traffic accident,a man of 25 years had severe left loin pain and hematuria. Intravenous urography (IVU) showed normal right kidney,but left kidney was not visualized. Nephrosonogram revealed perirenal hematoma around left kidney, Radionuclide renogram (99m Tc DTPA) by computerized gamma camera (Siemens Microdelta) showed normal right kidney,but left renal arterial phase was a bit smaller than the right. This patient required a nephrectomy.

Case 3 :

A man of 25 years had a bamboostick injury on right loin resulting in a big ecchymosis. USG shows normal liver & kidneys,but subcutaneous hematoma

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of 55x89 mm was noted which was improved over a few days.

Case 4 :

A multiparous woman of 35 years came with profound shock and severe abdominal pain following fall in the bathroom. USG revealed ruptured uterus and fetal distress. Fetal heart movement was present but feeble. Fetal biparietal diameter (BPD) was 51mm, femur length (FL) was 31 mm both correspond to about 21 weeks of gestation. She needed emergency hysterectomy.

Case 5 :

A man of 37 years had bile peritonitis following cholecystectomy on post-operative day.[2] USG showed considerable amount of fluid bile in the region of porta hepatis. He needed a repeat surgery immediately for repair of the bile leak from common bile duct.

Case 6 :

A man of 21 years had blunt trauma on the right side of the chest and complained of cough. USG revealed right pleural effusion. (Figure-1)

DISCUSSION

These six cases of trauma show the importance of non-invasive imaging procedure e.g. USG, nuclear scan etc. The sensitivity of the FAST (Focused Abdominal Sonography for Trauma) scan has ranged from 63% to 100%[2] -- a number of studies have not included clinicaloutcome, instead comparing sonography with computed tomography (CT), diagnostic peritoneal lavage or laparotomy ; these have had sensitivities in the range of 63% to 69%. In analysing these series with lower sensitivities, McGahan and associates stated two facts : (a) we can improve sensitivity by learning from our previous errors ; and (b) the focused abdominal sonography for trauma (FAST) scan will not detect all hollow-or solid-organ injuries.[2] Sonography can also identify pleural effusions, pneumothoraces, pericardial effusions and potential cardiac rupture in patients with chest trauma.[2] If large pockets of fluid are noted throughout the abdomen, Richards and associates often send these patients to surgery without confirmatory CT, especially if they are not hemodynamically stable.[8]

REFERENCES

1. McGahan JP. Richards JR. Jones CD, Gerscovich EO. Use of ultrasonography in the patient with acute renal trauma, J Ultrasound Med 1999 ; 207-213.
2. McGahan JP, Richards J, Gillen M. The focused abdominal sonography for trauma scan : Pearls and Pitfalls. J Ultrasound Med 2002 ; 21 : 789-800.
3. Kristensen JK, Buemann B, Kuehl E. Ultrasonic scanning in the diagnosis of splenic haematomas. Acta Chir Scand 1971 ; 137 : 653-657.
4. Asher WM, Parvin S, Virgilio RW, Haber K. Echographic evaluation of splenic injury after blunt trauma. Radiology 1976 ; 118 : 411-415.
5. McIlrath EM, Thomas PS. Trauma of the upper abdomen. In : Wilkins RA and Nunnerley HB (eds.). Imaging of the liver, pancreas and spleen. Oxford, Blackwell ; 1990 : 489-523.
6. Gilday DL, Alderson PO. Scintigraphic evaluation of liver and spleen injury. Sem Nucl Med 1974 ; 4 : 357-370.
7. Smith FW, Brown RG, Gilday DL, Ash JM. Bone marrow uptake of 99m Tc SC after severe abdominal trauma in children. Ped Radiol 1981 ; 10 : 169-171.
8. Richards JR, McGahan JP, Simpson JL, Tabar P. Bowel and mesenteric injury : evaluation with emergency abdominal US. Radiology 1999 ; 211 : 399 - 403.