Abstract of thesis

‘Radiological study of clavicle for age estimation’

The ossification process of medial clavicular epiphysis has been studied in the thesis submitted for age determination. The ossification stages have been retrospectively analyzed in 250 subjects of each sex falling in the age group of 12 to 30 years, as per protocol. Data was acquired by performing computed tomography (CT) chest of these patients on 16-slice Multi-detector CT scan machine using parameter---Kvp=120, mAs=150, Pitch factor=1.15, scan time=0.5sec and slice collimation=16x1.5. Data acquired was reconstructed in 2mm thick slices at bone window (450/1500) using kernel b60f (a filter suitable for viewing osseous structures).

The ossification process was evaluated on the basis of five stages classification criterion defined by Schmeling et al.,(2004). The stage 1 observed to be completed by 17 years of age in both the sexes. The onset of stage 2 was found approximately one year advanced (at the age of 14years) in females as compared to males and also finished one year earlier in females (18 years of age) than males. The commencement of stage 3 was found at same age in both the sexes, but finished one year earlier (at 25 years) in females than males. The stage 4 was also first observed one year later (at 21 years) in males than females, but was finished one year earlier (at 29 years) in males. The stage 5 was also commenced one year earlier (at 25 years) in females as compares to males. No case of stage 5 could be observed before 25 years of age in either of the sex.

Some technique specific parameters were also studied in addition to the above mentioned work so as to verify the effect of these parameters on the results and described as following:

- The ossification stages were studied in 100 subjects at different slice thickness (1mm,2mm, 3mm,5mm and 7mm) to find out the effect slice thickness on staging. The results were found to be identical with 1 and 2mm slice thickness, but the
staging was found different in some cases with 3mm, 5mm and 7mm slice thickness. Thus 2mm is the maximum slice thickness in CT recommended for this purpose.

- A comparison of ossification stages of medial clavicular epiphysis was done in 100 subjects using two modalities, CT and Digital Radiography, with the aim to find out the preferred modality for this purpose. The reliable assessment was not possible in 12 clavicles (6% of the sample) with Digital Radiography, but CT has allowed the assessment in all the cases and the results were not found in agreement with both the modalities in 37 clavicles (18.5%). It is therefore recommended to use the reference data of radiographic study for evaluating ossification stage from radiography and that of CT based study for evaluating the same from CT.

- A study was conducted using 100 subjects with the employment of dose reduction technique (AEC technique) in CT parameters to compare the quality of the scans and percentage dose reduction depending upon the BMI (Body Mass Index) of the subjects as compared to fixed parameters technique. No difference was found in the quality of scans, but the dose was reduced to almost half in a patient with BMI 16.64 Kgs/meter$^2$. This technique was found successful in avoiding the radiation exposure dose to the patients which is not required to produce CT images of diagnostic value.

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