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Place of tracheal configuration in the radiological assessment of goitres

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Summary

In a study of 160 unselected patients with goitre, 116 (72.5%) had tracheal deviation and ninety-two (57.5%) had tracheal narrowing. Tracheal deviation to the right constituted 65% of the lateral deviations, but when thyroid malignancies only were considered, a disproportionately large number (ten of the thirteen cases) showed deviation to the left.

Anterior deviation and irregular tracheal narrowing which were previously considered to be characteristic of thyroid malignancy are shown to be non-specific. Whereas irregular tracheal narrowing should still raise the suspicion of malignancy, a simple multinodular goitre may produce a similar appearance, resulting from variable degrees of pressure on the trachea by adjacent thyroid nodules of different sizes.

Résumé

Prenant au hasard le cas de 160 patients goitreux, il a été constaté que 116 d'entre eux, soit 72.5% souffraient de déviation tracheale, et que quatre-vingt dix-neuf d'entre eux, soit 57.6% souffraient d'un rétrécissement tracheal. La déviation tracheale vers la droite constituait 65% de toute inflexion laterale, mais en ne considérant que les affections thyroïdes malignes, on constate un nombre disproportionné de cas (dix sur les treize cas) manifestant une déviation vers la gauche.

La déviation antérieure aussi bien que le rétrécissement tracheal irrégulier, considérés auparavant comme caractéristiques de la malignité

thyroïde, se révèlent non-spécifiques. Bien que le rétrécissement tracheal irrégulier puisse laisser supposer une malignité, un simple goitre multinodulaire, par la variation des degrés de pression des nodules thyroïdes adjacents (de tailles différentes) sur la trachée artère, peut produire un effet similaire.

Introduction

Radiography of the neck and thoracic inlet in patients with goitre is of great value in assessing possible intrathoracic extension, the presence and pattern of thyroid calcification, associated cervical spine changes (Komolafe, 1982), and the determination of tracheal configuration. The following is an analysis of the tracheal configuration encountered in 160 unselected patients with goitre, in whom correlation with clinical, laboratory, surgical and histological findings has been carried out.

Materials and methods

Each patient presenting with goitre at the University College Hospital, Ibadan routinely has postero-anterior (PA) and lateral soft-tissue radiographs of the neck and thoracic inlet as well as a PA chest film.

The films obtained for 160 such patients seen over a 2-year period (1977-1979) were examined for presence or absence of tracheal deviation and tracheal narrowing. The direction of deviation, when present, was recorded accordingly as: (i) lateral to the right, (ii) lateral to the left, (iii) posterior, or (iv) anterior. Tracheal narrowing was recorded according to whether it occurred in its (i) coronal dimension, (ii) sagittal dimension, or (iii) in both dimensions. Cases of tracheal narrowing were sub-

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classified into: (a) uniform, or (b) irregular.

From the patients' hospital records, relevant personal data, symptoms, duration of thyroid swelling, results of laboratory thyroid function tests, operative finding (in patients who had thyroidectomy) and histological reports were collated.

Results

There were 140 females (87.5%) and twenty males (12.5%), with ages ranging from 13 to 80 years and a mean of 39 years.

Of the 160 patients, 116 (72.5%) had tracheal deviation, consisting of 139 displacements, as some patients had a combination of lateral co-existing with anterior or posterior deviation. Lateral deviation was most common (78.4%), with deviation to the right forming 47.5% and to the left 30.9% (Table 1). Of the eight patients with anterior deviation, in only three was the goitre malignant.

Tracheal narrowing was shown in ninety-two

patients (57.5% of the total), with a distribution as shown in Table 2. Narrowing in the coronal dimension occurred most frequently (51.1%). Tracheal narrowing was uniform in eighty patients and irregular in twelve. Of the latter group, only seven were malignant, the others being benign multinodular goitres.

Overall, there were thirteen patients (8.1%) with primary thyroid malignancy. The pattern of tracheal configuration in these thirteen patients is presented in Table 3. Contrary to the finding in the entire group, in which deviation to the right was predominant of the lateral deviations, in malignant goitres, tracheal deviation to the left occurred 3 times as commonly as deviation to the right.

Discussion

Assessment of tracheal configuration in goitres is of particular importance in patients in whom thyroidectomy is contemplated, as pre-operative evaluations of the trachea for devia-

Table 1. Overall tracheal deviation in goitres: distribution of 139 displacements

Direction of deviation	No. of patients	%
Lateral to right	66	47.5
Lateral to left	43	30.9
Posterior	22	15.8
Anterior	8	5.8
Total	139	100

Table 2. Tracheal narrowing in 92 goitre patients

	No. of patients	%
Direction of narrowing		
Coronal diameter	47	51.1
Sagittal diameter	28	30.4
Both diameters	17	18.5
Total	92	100%
Pattern of narrowing		
Uniform	80	87
Irregular	12	13
Total	92	100%

Table 3. Tracheal configuration in 13 patients with thyroid malignancy

	No. of patients
Direction of deviation	
Lateral to right	3
Lateral to left	10
Posterior	3
Anterior	2
Direction and pattern of narrowing	
Coronal diameter	7
Sagittal diameter	2
Both diameters	3
No narrowing	1
Uniform narrowing	5
Irregular narrowing	7

tion or narrowing can be made. This information permits the anaesthetist to pre-empt difficulties with tracheal intubation, and allows the surgeon to anticipate and guard against post-operative airway obstruction (Olurin, 1971). Furthermore, several authors have examined a possible relationship between particular types of tracheal configuration and thyroid malignancy (Schein, Lentino & Jacobson, 1956; Erazo & Wahner, 1966).

The results from the present series show that of all tracheal deviations, lateral deviation occurred most commonly, constituting 78.4% of the cases. Lateral deviation was similarly found to predominate in the series reported by Erazo & Wahner (1966). This is not unexpected, in view of the lateral location of the major thyroid lobes relative to the trachea. This anatomical relationship probably also explains why narrowing occurs more often in the coronal than in the sagittal diameter of the trachea (Table 2).

That tracheal deviation to the right in non-malignant goitres occurs more frequently than to the left (Table 1 and Fig. 1) is probably due to the splinting effect of the aortic arch, which is located to the left of the trachea. The reason for the finding of more frequent tracheal deviations to the left in the cases of thyroid malignancy (Fig. 2 and Table 3) is most probably due to the finding that cancer occurs more frequently in the right than left lobe of the thyroid (Olurin & Ajayi, 1974). Perhaps it is also a reflection of the lack of respect for normal anatomic boundaries exhibited by many malignancies.



Fig. 1. Antero-posterior view of neck and thoracic inlet. The trachea is markedly deviated to the right, with no associated narrowing. A calcific focus is noted in the goitre (arrow). Histology: benign multinodular goitre.

Anterior displacement of the trachea has also been stressed as a feature of malignant thyroid tumours (Erazo & Wahner, 1966). This does not agree with the findings in the present report, in which of the eight patients that

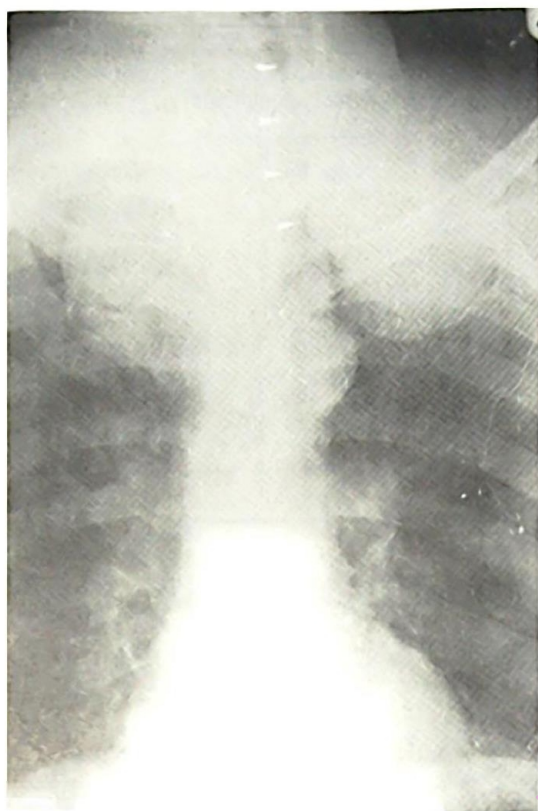


Fig. 2. Chest and thoracic inlet showing irregular narrowing and deviation of the trachea to the left (arrow heads). There is intrathoracic extension. Histology: follicular carcinoma.

showed anterior tracheal displacement only two had thyroid malignancy (Fig. 3). Indeed, in his review of simple giant goitres, defined as simple goitres weighing at least 10 mg/kg body weight, Olurin (1971, 1979) found anterior displacement to be most common, followed by lateral and then posterior. In such giant goitres, the trachea is elongated and becomes 'floating' immediately after thyroidectomy. Such patients often require tracheostomy and gathering plication of the muscles anterior to the trachea to reduce the sub-muscular space and avert post-operative respiratory distress from airway obstruction (Olurin, 1971).

Another notable feature of anterior and posterior tracheal displacements is that clinical palpation is of little value for their assessment (Kreel, Bloom & Piercy, 1965) and recourse has to be made to radiography (Fig. 4).

It has been shown that both benign and malignant thyroid masses can produce tracheal



Fig. 3. Lateral view of neck. There is anterior deviation of the trachea but no narrowing. Note multiple nodular calcifications within the goitre. Histology: benign multinodular goitre.

deviation (Schein *et al.*, 1956), and the present report also agrees with this (Figs. 1 and 2).

In the report by Erazo and Wahner (1966), it was stressed that in spite of marked displacement, the trachea in a benign goitre has a normal diameter or is smoothly indented, in contrast to an irregular narrowing of tracheal calibre in a malignant thyroid. In the present report, irregular tracheal narrowing was found in seven of the thirteen cases of thyroid malignancy and in five patients with simple multinodular goitre (Table 3 and Fig. 5). Variable pressure exerted on the trachea by adjacent thyroid nodules of different sizes in a multinodular goitre is the probable explanation for irregular tracheal narrowing in such cases. This appearance should not therefore be considered as pathognomic of thyroid malignancy.

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Fig. 4. Lateral neck showing severe posterior displacement of the trachea and narrowing of its sagittal diameter. The goitre contains multiple calcific foci. Histology: benign multinodular goitre.

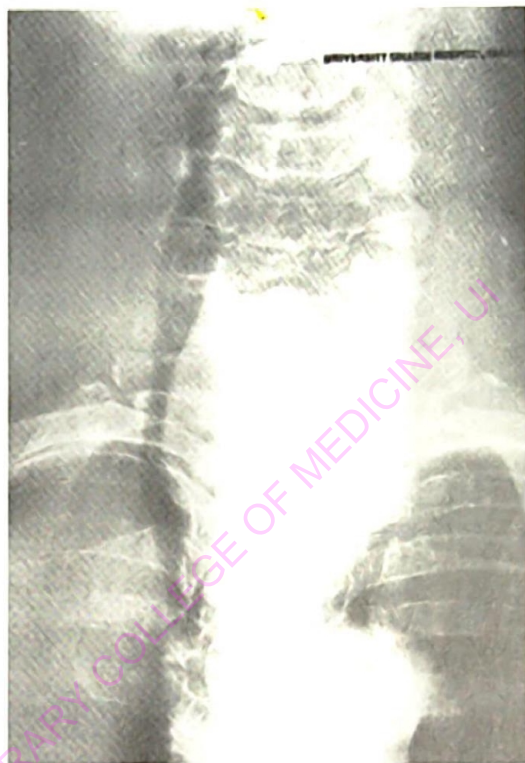


Fig. 5. Antero-posterior view of neck. There is deviation to the right and non-uniform narrowing of its coronal diameter. Histology: benign multinodular goitre.

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