

Section of Surgery

President

Professor Lambert C Rogers CBE VRD FRCS

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Short Papers

Inadvertent Parathyroidectomy

by R S Murley MS FRCS and
P M Peters DM (London)

Our preoccupation with this problem stemmed from the chance finding of parathyroid tissue on the specimen from a patient who had progressed uneventfully after partial thyroidectomy. In contrast to this we had known tetany to occur in a number of patients whose operation specimens had shown no trace of parathyroid tissue after careful search. Although parathyroid tissue had rarely been recognized on operation specimens in our laboratory it was felt that specific search might well bring more parathyroids to light.

Since August 1, 1954, the pathologists have undertaken a detailed search of all thyroid operation specimens passing through the Group laboratory with the object of revealing every possible scrap of parathyroid tissue. The objects of this investigation were twofold: (1) to determine the incidence of what has now been termed 'inadvertent parathyroidectomy'; (2) to ascertain the relationship to post-operative tetany.

Material: Most of the operations were done at the Royal Northern Hospital and the remainder at two other hospitals in the Group. The Royal Northern specimens came from both the general theatres and the private wing. A number of different surgeons were responsible for these operations.

Laboratory search: Naked-eye identification of parathyroid tissue in the laboratory, though often easy, can be difficult. Approximately 70% of the parathyroids found have been identified in this way. In about 40% of specimens on which the pathologist suspected parathyroid tissue he failed to confirm it on microscopy. Classically yellowish or brownish, the parathyroids are sometimes con-

cealed in fat, lymphoid tissue, thyroid, or even in contiguous thymus. Sequestered thyroid nodules, lymph nodes, fragments of congested fat and thymic remnants may all resemble parathyroids.

Operative search: The surgeon should be able to identify much parathyroid tissue with reasonable certainty. He has the advantage over the pathologist of seeing the living and relatively undisturbed

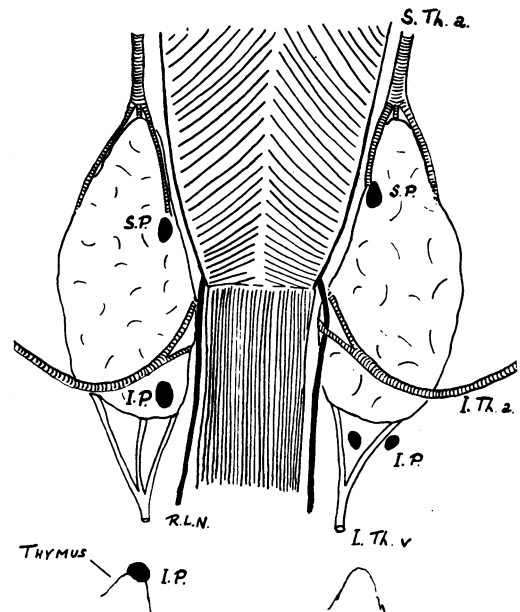


Fig 1 Lateral lobes of thyroid seen from behind to show position of parathyroid glands (much simplified from Gilmour, 1938). In 74% of cases the superior glands (S.P.) are situated on the posterior border of the middle third of the thyroid as seen on the left. In a further 10% the superior glands are related to the upper third of the thyroid as on right. About 60% of inferior parathyroids (I.P.) are situated as on left, and in 13% they lie with tributaries of the inferior thyroid vein. Much less often an inferior parathyroid is related to thymus. S.Th.a., superior thyroid artery. I.Th.a., inferior thyroid artery. I.Th.v., inferior thyroid vein, recurrent laryngeal nerve.

anatomy of the operation site, but he suffers the disadvantage that he should not usually subject suspicious tissue to histological section. Glands concealed in fat or other tissue will be missed, but inadvertent removal of such concealed glands can often be avoided by thoughtful handling of suspect and potentially risky sites.

The vascularity of parathyroids is well known and pinching the very margin of suspect tissue with fine dissecting forceps can assist identification. In mentioning this test one must strongly deprecate its facile use since extensive contusion of parathyroids may ensue.

Anatomy: The gross anatomy of the parathyroid glands in the cadaver was carefully studied and fully reported by Gilmour (1938). In about 90% of cases there are 4 parathyroid glands. In the remaining 10% the number varies from 2 to 6 or more. Despite the possible wide variations in the position of these glands described by Gilmour, the majority of parathyroid tissue is situated at well-defined sites (Fig 1). The superior glands tend to lie close to the posterior division of the superior thyroid artery; the higher they are the greater is the possibility of inclusion with the upper poles of the resected thyroid. The inferior parathyroids may be at the back of the lower pole of the thyroid, immediately below the lower pole amongst tributaries of the inferior thyroid vein, and sometimes in contact with or concealed within thymic or sequestered thyroid tissue.

Operative precautions: The most important operative steps in avoiding inadvertent parathyroidectomy include the following: (1) Full exposure which, in most cases, should include freeing of the sternomastoids and division of the strap muscles. (2) Ligation of inferior thyroid vein tributaries close to the thyroid. (3) Critical inspection of the back of the upper pole before resection. (4) Peeling back the thyroid capsule at known parathyroid sites and wherever suspect parathyroid or 'fatty' tissue is seen. (5) Careful scrutiny of sequestered thyroid nodules before their removal. (6) Avoiding removal of contiguous lymphoid and thymic tissue. (7) A gentle technique to avoid undue trauma, especially when applying hæmostats to thyroid tissue or stitching the gland remnants.

With these facts firmly in mind the surgeon might anticipate that removal of parathyroids would be a rare occurrence but this study has proved otherwise.

Analysis of specimens: In the first five years of this investigation 332 thyroid specimens were examined, 46 of which included parathyroid tissue. Two parathyroid glands were present on 5

of the 46 specimens (Table 1). The various case records are not sufficiently complete to allow the precise extent of the thyroid resection to be determined for the whole series. However, these details are given in Table 3 for a personal series of cases.

Table 1

Inadvertent parathyroidectomy. Royal Northern Group. August 1954-July 1959 inclusive

Total thyroid specimens examined	332
Number with parathyroid tissue	46
41 specimens included one parathyroid	
5 specimens included two parathyroids	
Incidence of inadvertent parathyroidectomy	13.9%
Tetany recorded in 5 cases	

The relatively high incidence of inadvertent parathyroidectomy was certainly surprising. One of us (R S M), despite the exercise of what was felt to be considerable care, gained the impression that he was removing at least as many parathyroids as everyone else. But further analysis (Table 2) showed that the proportion of parathyroids in this personal series was lower than in the group as a whole. No credit is claimed for these figures since, of all the surgeons taking part, only the surgical author was aware of the investigation.

Table 2

Inadvertent parathyroidectomy. Comparative incidence in personal series and rest of group

Surgeon	Cases	Parathyroid tissue	Incidence
R S M	142	14	9.9%
Others	190	32	16.8%
Total	332	46	13.9%

The personal series included in Table 3 covers a longer period than the whole series. Each of the case notes in the personal series includes a sketch with precise measurements of the resected gland and residual tissue. Any parathyroids seen in the neck are marked on the sketch as are details of accidentally detached and reimplanted glands, of which there were three in this group. The incidence of parathyroid removal and tetany in relation to different types of operation is shown in Table 3, the commonest procedure being bilateral partial thyroidectomy. The term subtotal thyroidectomy is avoided since it is sometimes applied to what we regard as an ill-advised and super-radical resection in which mere buttons of thyroid tissue are left. This analysis is offered as a simple factual record and not because it justifies any significant deductions about the relative hazard of different procedures. In this particular series there does not seem to have been any greater hazard from the more extensive operations.

Transient tetany occurred in 3 cases of the personal series, one of which included a parathyroid on the specimen. Though these 3 cases of tetany occurred in toxic patients it is interesting to note that parathyroidectomy occurred more often in non-toxic cases. The incidence of inadvertent parathyroidectomy remains about the same in the larger personal series (Table 3) since it includes 2 cases in which deliberate marginal biopsy of suspect tissue was done to convince sceptical assistants.

In the personal series of cases the position of the parathyroids on the specimens is recorded as follows: Lower pole 8 cases; upper pole 3 cases; no site specified 6 cases (4 of these were only found in histological sections); biopsy 2 cases (both inferior glands). The inferior parathyroids are therefore more at risk than the superior ones.

Table 3
Type of resection in relation to parathyroidectomy and tetany

Type of resection	Cases	Parathyroid present	Transient tetany
Bilateral partial	118 (44)	13	3 (only one with parathyroid)
Partial one side, hemi other side	28 (3)	2	0
Hemithyroid	23 (2)	4	0
Partial one side	3	0	0
Whole thyroid	6	0	0
Total cases	178 (49)	19 ●	3 (all toxic)

This personal series covers a slightly longer period than Tables 1 & 2

Figures in parenthesis indicate toxic cases.

● In 2 of the 19 cases a deliberate biopsy of the edge of a suspect gland was done.

Conclusions: Inadvertent parathyroidectomy is much more common than is generally appreciated. The high incidence in this series is, we believe, better attributed to the zeal of the pathologists than the clumsiness of the surgeons. Most of the subjects of inadvertent parathyroidectomy suffer no apparent tetany or other penalty from gland removal. Indeed, tetany often occurs in the absence of parathyroidectomy when it is usually transient and presumably due to bruising of parathyroids. That tetany is more common after operations for toxic goitre is probably due to the greater vascularity of the thyroid and other local peculiarities in such cases.

The practical lesson to be learnt from this research is that, despite the exercise of considerable care at operation, inadvertent removal of parathyroids is not uncommon. It rarely causes serious trouble, but it is clearly a hazard which, together with rough handling of parathyroids, every surgeon should try to reduce to a minimum. That care in this connexion is important is shown by the recent publication by Painter (1960) of

figures from one hospital in which a 13% incidence of *permanent tetany* is recorded following 46 operations for toxic goitre. It is further underlined by our own observation at one hospital of a thyroidectomy specimen which included four parathyroids from a patient who suffered bilateral recurrent nerve palsy as well as permanent tetany.

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Clinical Experiences of the Lesser Known Manifestations of Hyperparathyroidism

Arnold S Aldis FRCS (Cardiff)

Generalized osteitis fibrosa cystica as described by Friedrich von Recklinghausen is a rare disease, but its clinical features are so striking, and its pathology so distinctive, that the condition is familiar to every medical student. So also is the fact that the condition is due to a tumour of the parathyroid glands and this has led some to the false conclusion that tumours of the parathyroids must be equally rare, for it is not sufficiently appreciated that hyperparathyroidism due either to hypertrophy or tumours of the parathyroids may produce many other symptoms than those of osteitis fibrosa cystica. This would be of little consequence if these other symptoms were always associated with diagnostic bone changes of von Recklinghausen's disease, but this is not the case, for hyperparathyroidism may result in serious and even fatal disease without producing any clinical or gross radiological evidence of bone lesions. When all these conditions which may result from hypertrophy of tumours of the parathyroids are taken into account they can no longer be regarded as rare, and their recognition is important for they are both serious and at the same time eminently treatable, at least in their earlier stages.

It is the purpose of this paper to draw attention again to some of the ways in which parathyroid tumours may present other than with the classical picture of von Recklinghausen's disease, and which have been encountered in a small series of patients seen and treated in Cardiff. The importance of parathyroid tumours in the genesis of renal calculi is now sufficiently well recognized to