

Distribution of the solitary adenoma over the parathyroid glands

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Abstract

One hundred and ten patients with primary hyperparathyroidism were studied, in which a normal parathyroid gland was found on the same side as an adenoma (both confirmed by histological examination), and the upper or lower location could clearly be defined during surgery. The distribution of the adenomas over the upper and lower glands was unequal: 61.8 per cent in the superior versus 38.2 per cent in the inferior position. Statistical analysis revealed that this is not a random distribution ($p = 0.013$). The explanation of this relative predilection is unknown. The finding should not influence the surgical procedure for primary hyperparathyroidism.

Key words: Hyperparathyroidism; Adenoma; Anatomy

Introduction

Solitary adenomas occur in every parathyroid gland, but it is not known whether they are equally divided over the right, left, superior and inferior glands. In the literature there are no indications that there should be anything other than a statistically uniform distribution. Schwartz (1990) mentions that adenomas are found more often in the inferior glands, without giving more details.

Method

This is an overview of 110 patients operated for primary hyperparathyroidism from 1992 to 1996, who met the following criteria: one adenoma was found together with a normal gland at the same side, and, after complete dissection of the adenoma, there was no reasonable doubt about the relatively superior and inferior position of both. Thus were excluded: cases without a normal gland at the same side even when it seemed clear that the adenoma was superior or inferior, the rare cases with two adenomas, and when the adenoma and the normal gland were at about the same level.

Pathological examination confirmed the nature of the adenoma and the normal glands. On the contralateral side we identified two normal parathyroid glands in 97 patients and one normal gland in 13 patients.

Results

The distribution of the adenomas over the four parathyroid glands is shown in Figure 1. Sixty-eight adenomas (61.8 per cent) were located in the

superior glands versus 42 (38.2 per cent) in the inferior glands. The Chi-squared test shows that this is a statistically significant difference ($p = 0.013$).

For the right-left distribution (57 versus 53) the difference was not statistically different ($p = 0.703$).

Discussion

We have no explanation for the slightly higher incidence of solitary adenomas in the upper parathyroid glands. It has been argued that parts of the adenomas are multicellular (and multiglandular) in origin, and that in a later stage the cells of one gland become autonomous and suppress the other glands, resulting in a single adenoma (Fialkow *et al.*, 1977; Paloyan *et al.*, 1991). In the literature there are very few indications that the superior and inferior parathyroid glands differ from each other. We know that during embryogenesis the superior glands arise from the fourth branchial pouch, while the inferior glands are derived from the third branchial pouch. In adult anatomy it is possible that the vascular supply is not the same (Attie and

| | right | left | |
|----------|-----------------|-----------------|--------------|
| superior | 36 | 32 | = 68 (61.8%) |
| inferior | 21 | 21 | = 42 (38.2%) |
| | = 57 (51.8%) | = 53 (48.2%) | |

FIG. 1

Location of the parathyroid adenoma in 110 patients.

Khafif, 1975; Petti, 1990). The superior glands have a tendency to lie nearer to the inferior thyroid artery. The inferior parathyroid glands show a more variable location, eventually more remote from this feeding artery. That the upper parathyroids should statistically have a somewhat better vascularization is highly speculative.

The practical implications are, in our opinion, negligible. In fact, the numerical difference between the superior and inferior location is too small to influence the usual surgical procedure for primary hyperparathyroidism (Lucas *et al.*, 1990; Tibblin *et al.*, 1991; Salti *et al.*, 1992). It remains our policy to identify as many parathyroid glands as possible. We continue to begin inferiorly in the neck, in order to avoid displacing tissue at the inferior pole of the thyroid lobe of the thyrothymic ligament, the upper thymus) into the mediastinum before the inferior parathyroid gland is explored.

From a theoretical point of view the distribution of adenomas suggests the possibility that the upper and lower parathyroid glands have different characteristics.

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