Leading article

Minimally invasive surgery of the thyroid and parathyroid glands

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Bilateral cervical exploration has remained the preferred surgical approach in patients with thyroid and parathyroid disease for many years. Although this operation has enjoyed a high success rate, with negligible associated morbidity and mortality[1], it is challenged today by new, less invasive, procedures. The terms minimally invasive thyroidectomy (MIT) and minimally invasive parathyroidectomy (MIP) cover a large spectrum of operations, and can be misleading. Surgery may be considered minimally invasive in respect of not only the length of skin incision but also the accessibility of the operative field and extent of dissection. As conventional cervicotomy incisions are 4–6 cm long, it is hardly appropriate to consider any incision over 3 cm to be minimally invasive. Furthermore, operations that employ an extracervical approach, which have the advantage of leaving no scar in the neck, cannot reasonably be described as minimally invasive as they require more dissection than conventional open surgery. Thus, MIT and MIP should properly be defined as operations through a short (less than 3 cm) and discrete incision that permits direct access to the thyroid or parathyroid glands, resulting in a focused dissection.

MIT and MIP access may be divided in two groups: open approaches performed under direct vision via a small cervical incision[2,3], and various endoscopic approaches[4–6]. Although 'mini' open techniques are suitable for day-case surgery and can be performed under local or cervical block anaesthesia, the endoscope has the advantage of improved lighting and magnification, resulting in an excellent view for the surgeon. It is probably more difficult to obtain an adequate view of key structures under direct vision through a mini-incision, even when a head light and surgical loupe are used, than it is through the endoscope.

Endoscopic neck procedures can be performed partially or totally with the help of the endoscope. In western countries, three endoscopic techniques are in current use. First, there is the pure endoscopic midline approach, using constant gas insufflation and four trocars[4]. Second is the gasless video-assisted technique, which is carried out through a 15-mm midline incision[5] and requires small conventional retractors to maintain the operative space; an additional assistant is needed. Both of these techniques permit a bilateral exploration. The third method uses an endoscopic lateral approach, developing the plane between the carotid sheath laterally and the strap muscles medially[6]. Although this 'back door' route provides excellent exposure for identification of the recurrent laryngeal nerve and parathyroid glands, it does not permit a bilateral exploration. The dissemination of endoscopic surgery is hindered by its long learning curve. In this context the video-assisted method has the attraction of using conventional instruments, and is relatively easier to learn than the other endoscopic techniques. With increasing experience and advances in surgical instrument design, shorter operating times may be anticipated.

Parathyroid glands are particularly suitable for minimally invasive surgery as most parathyroid tumours are small and benign, and MIP is only an ablative procedure. MIP techniques have one common thread, namely that the operation is targeted on one specific gland, a concept of limited exploration based on the fact that 85 per cent of patients have single-gland disease. MIP has been made possible by improvement in preoperative localization techniques using sestamibi scanning and ultrasonography. Nevertheless, whether localization can rule out multiglandular disease with sufficient accuracy is questionable, and for most surgeons the risk of missing multiglandular disease justifies the routine use of the quick intraoperative parathyroid hormone assay[7]. Patients suspected of having multiglandular disease on imaging studies or who have familial hyperparathyroidism are not suitable for MIP. MIP should be considered only for patients with sporadic hyperparathyroidism in whom a single adenoma has been clearly localized by ultrasonography and sestamibi scanning[8]. Even so, associated goitre or previous neck operation are relative contraindications. According to different authors, between 57 and 71 per cent of patients with primary hyperparathyroidism are suitable for the minimally invasive procedure. Depending on the type of access employed, conversion to conventional parathyroidectomy is necessary in 8–15 per cent of operations[5,6]. After MIP, more than 95 per cent of patients are normocalcaemic[2,5,6], but it must be appreciated that these results have been obtained in carefully

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selected patients. Longer follow-up is needed before the real risk of recurrent disease can be evaluated.

The role of MIT requires further clarification[9,10]. Initially, the indication was a solitary thyroid nodule of diameter less than 3 cm in an otherwise normal gland; candidate lesions were typically small follicular nodules of indeterminate cytology and small toxic nodules. The principal contraindications included previous neck surgery or irradiation, a history of thyroiditis, and a thyroid lobe volume greater than 20 ml (estimated by ultrasonography). Today, MIT may also be considered for small nodular goitres, Graves' disease and low-risk papillary thyroid cancer. Some concern remains about MIT in this last group, but preliminary results are similar to those of conventional surgery, both in terms of ^{131}I uptake and serum thyroglobulin level[10]. Depending on the technique to be employed and the accuracy of fine-needle aspiration cytology, MIT may be indicated in 5–35 per cent of patients requiring thyroid surgery. It might be thought that with more accurate cytology MIT would be needed less, but an expanding volume of systematic thyroid ultrasonography may lead to increasing discovery of suspicious subclinical nodules that might benefit from MIT.

The demonstration of meaningful advantages for MIP and MIT over conventional surgery is not easy[2,3,5,6,10]. The overall complication rates are similar and only the mini open approach is more favourable than conventional operation in terms of surgical time[2]. MIP and MIT do not reduce the length of hospital stay, and whether or not they are less costly than traditional surgery is difficult to quantify. Still, diminution of postoperative pain is especially impressive on the first postoperative day, and the reduction in the length of the scar to less than 3 cm is appealing to most patients. Overall, MIP and MIT seem to be an advance, but only randomized studies will demonstrate any real benefit. There is probably no 'one procedure for one disease'; it is likely that minimally invasive and conventional thyroid and parathyroid surgery will turn out to be complementary.

References

1 Van Heerden JA, Grant CS. Surgical management of primary hyperparathyroidism: an institutional perspective. *World J Surg* 1991; **15**: 688–692.
2 Udelsman R, Donovan PI. Open minimally invasive parathyroid surgery. *World J Surg* 2004; **28**: 1224–1226.
3 Palazzo FF, Sywak MS, Sidhu SB, Delbridge LW. Safety and feasibility of thyroid lobectomy via a lateral 2·5 cm incision with a cohort comparison of the first 50 cases: evolution of a surgical approach. *Langenbecks Arch Surg* 2005; **390**: 230–235.
4 Gagner M, Rubino F. Endoscopic parathyroidectomy. In: *Endocrine Surgery*, Schwartz AE, Pertsemlidis D, Gagner M (eds). Marcel Dekker: New York, 2004; 289–296.
5 Miccoli P, Berti P, Materazzi G, Massi M, Picone A, Minuto MN. Results of video-assisted parathyroidectomy: single institution's six-year experience. *World J Surg* 2004; **28**: 1216–1218.
6 Henry JF, Sebag F, Tamagnini P, Forman C, Silaghi H. Endoscopic parathyroid surgery: results of 365 consecutive procedures. *World J Surg* 2004; **28**: 1219–1223.
7 Irvin GL III, Carneiro-Pla DM. Intraoperative parathyroid hormone assay as a surgical adjunct in patients with sporadic primary hyperparathyroidism. In: *Textbook of Endocrine Surgery*, Clark OH, Duh QY, Kebebey E (eds). Elsevier Saunders: Philadelphia, 2005; 472–480.
8 Sebag S, Hubbard JG, Maweja S, Misso C, Tardivet L, Henry JF. Negative preoperative localization studies are highly predictive of multiglandular disease in sporadic primary hyperparathyroidism. *Surgery* 2003; **134**: 1038–1042.
9 Duh QY. Presidential address: Minimally invasive endocrine surgery – standard of treatment or hype? *Surgery* 2003; **134**: 849–857.
10 Miccoli P, Berti P, Raffaelli M, Materazzi G, Baldacci S, Rossi G. Comparison between minimally invasive video-assisted thyroidectomy and conventional thyroidectomy: a prospective randomized study. *Surgery* 2001; **130**: 1039–1043.

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