

Paper

# Minimally invasive parathyroid exploration for solitary adenoma. Initial experience with an open, 'short incision' approach.

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## SUMMARY

**Background:** In the vast majority of patients with primary hyperparathyroidism (HPT) the causative pathology is a benign solitary adenoma. The conventional surgical approach for HPT has involved bilateral cervical exploration with attempted identification of all four parathyroids and resection of enlarged glands. However, in recent years new techniques have permitted accurate preoperative localisation of the single parathyroid tumour in many patients. This has facilitated a focused unilateral operation to be performed in patients with a solitary parathyroid adenoma. More recently we have progressed to a minimally invasive surgical approach for such individuals in whom the tumour has been localised preoperatively.

**Patients & Methods:** Between September 2004 and July 2006, 24 patients with proven HPT, underwent focused, unilateral cervical exploration through a short (2.5-3 cm) incision placed low on the appropriate side of the neck. Preoperatively, each patient had been shown to have a single focus of activity after parathyroid isotope scanning.

**Results:** There were 21 females and 3 males in the study group with a mean age of 61.5 years (range 25 - 84 years) at the time of operation. The approach was successful in 22 patients with a mean operating time of 49 minutes (range 22-85 minutes). Postoperatively, the serum calcium level returned to normal in every patient and has remained so during a mean follow up period of 11.5 months (range 1-22 months). No individual developed postoperative hypocalcaemia although one patient developed a temporary unilateral vocal cord paralysis.

**Conclusion:** A short incision cervical approach for HPT due to solitary adenoma is a viable alternative for appropriately selected patients.

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## INTRODUCTION

Primary hyperparathyroidism (HPT) is a common disease and in the vast majority of patients, the underlying pathology is a solitary benign adenoma<sup>1-3</sup>. Historically, the conventional surgical approach for the patient with HPT has involved routine bilateral cervical exploration with attempted identification of all four parathyroids and surgical resection of enlarged glands.

However, with the availability of new techniques which permit accurate preoperative localisation of the single tumour in a significant proportion of patients, we have, for some time, practised a surgical strategy of focused unilateral operation for individuals with HPT due to solitary adenoma and in whom the tumour has been localised preoperatively.

Our experience with this innovative approach indicates clearly that, provided a set of exclusion criteria for unilateral neck exploration is strictly applied, a focused unilateral operation leaves the patient no more vulnerable to persistent or recurrent hypercalcaemia than a standard bilateral procedure<sup>4,5</sup>.

Against this background a number of less invasive surgical procedures have begun to emerge, all of which involve a

focused operation for solitary parathyroid adenoma after preoperative localisation of the tumour and using either an endoscopic or a limited open surgical approach<sup>6-8</sup>.

We have been attracted to one such approach utilising a short incision placed low in the neck on the side of the tumour, and which has the potential for achieving a pleasing cosmetic outcome for the patient. We report our early experience with this new type of surgical exploration.

## PATIENTS AND METHODS

Between September 2004 and July 2006, 24 patients with proven HPT were selected to undergo a focused, unilateral parathyroid exploration through a short (2.5-3 cm) incision placed low on the appropriate side of the neck (Fig.1). Preoperatively, each patient had undergone dual isotope subtraction scintigraphy<sup>9-12</sup> and had been shown on scan to have a single focus of activity following subtraction.

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Fig 1. 2.5cm skin crease incision low in left neck over scan detected solitary parathyroid adenoma

Prior to operation the proposed procedure was discussed in detail with every patient selected, with particular reference to the small possibility of injury to the recurrent laryngeal nerve and the potential for the requirement to convert to a standard neck exploration through a full 'collar' incision.



Fig 2. Incision deepened through subcutaneous tissue and platysma muscle.

All the operations were carried out under general anaesthesia with full muscle relaxation. Following incision of the skin the platysma muscle is divided in the line of the incision (Fig 2). The anterior border of the sternocleidomastoid muscle is then identified and freed in both cranial and caudal directions. The space between the carotid sheath structures laterally and the strap muscles medially is now opened and developed and the lateral lobe of the thyroid gland is identified and, if necessary, delivered into the wound (Fig 3). A careful search is now made for the parathyroid tumour, which is identified, mobilised and removed (Fig 3). Individual small vascular clips are employed to secure the vascular pedicle associated with the tumour. The thyroid lobe is then replaced and the wound closed with an absorbable subcuticular suture (Fig 4).

## RESULTS

Of the 24 patients included in this pilot study 21 were female and 3 male with a mean age at operation of 61.5 years (range 25 - 84 years). All patients had a proven biochemical diagnosis of HPT with persistent hypercalcaemia and concomitant elevated or inappropriate plasma level of parathyroid hormone (PTH, intact molecule assay). Individual patient details are recorded in Table I.

In two individuals, the parathyroid adenoma could not be convincingly identified via the small incision and the procedures were therefore converted to full neck exploration by extending the skin incision into a standard collar wound and exploring the relevant side in regular fashion from the midline. In both patients, the tumour was subsequently located at the site suggested by the isotope scan. The mean operating time for the remaining 22 patients was 49 minutes (range 22 - 85min).



Fig 3. Parathyroid tumour mobilised and delivered into wound.

Postoperatively, the serum calcium level returned to within the normal range in every patient operated by the minimally invasive technique and has subsequently remained so during a mean follow up period of 11.5 months (range 1-22 months), Table I. There were no symptoms of hypocalcaemia in any individual following operation. One patient was found to have a unilateral vocal cord paralysis on routine postoperative indirect laryngoscopy but demonstrated a normal voice and explosive cough at review a few months later.



Fig 4. Skin incision closed using subcuticular absorbable suture.

## DISCUSSION

There is now ample and unequivocal evidence that focused, unilateral parathyroid exploration can be carried out in appropriately selected patients with HPT, without increased incidence of persistent or recurrent hypercalcaemia following operation<sup>4,5</sup>. Although we have been long time advocates of this type of surgical approach, we have consistently and repeatedly emphasised the importance of applying a strict set of exclusion criteria for unilateral neck exploration

TABLE I

Serial No.	Age (Years)	Sex	Serum Calcium(mmol/l) (Preoperative)	Serum Calcium(mmol/l) Postoperative	Operation Time (Minutes)	Complications	Follow-Up (Months)
1	69	M	2.79	2.38	36	Nil	22
2	48	F	3.11	2.30	43	Nil	18
3	48	F	3.19	2.28	45	Nil	18
4	84	F	2.76	2.39	22	Nil	17
5	59b	F	2.72	2.46	60	Nil	16
6	63	F	3.09	2.48	50	Nil	15
7	35	F	3.21	2.31	50	Nil	15
8	46	F	3.00	2.43	66	V.C Palsy	15
9	78	F	3.02	2.48	50	Nil	15
10	81	F	2.76	2.46	44	Nil	14
11	60	F	2.75	2.20	38	Nil	12
12	67	F	2.97	2.31	52	Nil	11
13	79	F	3.18	2.33	51	Nil	11
14	54	F	3.02	2.32	85	Nil	10
15	54	F	3.07	2.15	32	Nil	9
16	74	F	3.02	2.26	30	Nil	7
17	61	F	2.70	2.40	70	Nil	7
18	62	F	2.88	2.29	47	Nil	7
19	83	F	2.98	2.24	32	Nil	6
20	69	F	2.86	2.32	75	Nil	6
21	25	M	2.96	2..12	51	Conversion to standard procedure	2
22	53	M	3.10	2.14	77	Conversion to standard procedure Nil Nil	2
23	66	F	2.98	2.31	60		1
24	58	F	2.94	2.12	40		1

when patients are being considered for a limited, focused operation. If any such criterion exists then the individual in question should have a standard bilateral cervical exploration performed.

Previously, we have carried out scan-directed unilateral neck exploration for HPT using a standard collar incision placed low and centrally in the neck. Results from our earlier studies have provided a sound evidence base and have given others and us the confidence to progress to less invasive and cosmetically more favourable surgical approaches for patients with HPT due to solitary adenoma. These new procedures include full endoscopic parathyroidectomy<sup>6,13</sup>, video-assisted open parathyroidectomy<sup>7</sup> and open 'short incision' parathyroidectomy with<sup>14</sup> or without<sup>8</sup> the use of intraoperative measurement of PTH. Having considered the various 'minimally invasive' procedures available, and influenced to some extent by the important report by Gauger and colleagues on the feasibility of the endoscopically assisted technique<sup>15</sup>, we have chosen to pursue, in the first instance, a strategy of open parathyroidectomy via a carefully placed short incision, in appropriately selected individuals. Initial reports from other centres employing this approach have been encouraging<sup>8,14</sup> and our initial experience with it, recorded in

this report, justifies we believe, a continuation of the use of this technique.

Of the 24 patients reported here and on whom we operated on an 'intention to treat' basis via a short lateral cervical incision, two required conversion to a full open exploration through a collar incision because we were unable to convincingly identify the parathyroid tumour via the initial approach. We feel that this initial 8.3% conversion rate to full open operation probably reflects our current position on the learning curve for this new procedure. We have, however, been surprised and impressed by the extent of the exposure of the thyroid lobe and the parathyroid glands that can be achieved via a very limited skin incision (Figs 3, 4). Our patients and we have also been pleased with the relatively short-term cosmetic results of this type of approach. It is of course an absolute requirement for this type of surgical procedure that the parathyroid tumour is accurately and unequivocally localised prior to operation.

For many years we have routinely utilised double isotope subtraction scintigraphy as a preoperative localisation investigation in patients diagnosed with HPT<sup>10,16</sup> and we continue to employ this type of scan as the only routine localisation study prior to operation. It has been suggested that before undergoing a minimally invasive focused unilateral

operation for HPT a patient should have concordant positive localisation results from two independent techniques, for example, Sestamibi isotope scanning and ultrasonography. However on the basis of our experience to date, and in the absence of any convincing, objective evidence that there is such requirement (specifically no prospective randomised studies) we would question the necessity for localisation concordance using two different investigations.

Finally, we would reiterate our view that the type of surgical procedure described in this paper should not be regarded as an 'easy option' to be undertaken by any surgeon working in the neck. If the high levels of successful outcomes together with concomitant low complication rates for patients undergoing parathyroid exploration are to be maintained, then parathyroid surgery should continue to be performed only by specialist endocrine surgeons who are familiar with the embryology and anatomy of the glands and who are fully trained in the spectrum of parathyroid surgical procedures.

The authors have no conflict of interest.

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