

Total Parathyroidectomy Under Local Anaesthesia for Renal Hyperparathyroidism

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INTRODUCTION: Renal hyperparathyroidism with attendant osteodystrophy is a frequent and severe morbidity affecting the quality of life of end stage renal failure patients surviving on long-term renal replacement therapy. A small subgroup of these patients with severe cardiorespiratory dysfunction was deemed at very high risk for general anaesthesia (GA). We report on a series of total parathyroidectomy under local anaesthesia (LA) for these patients.

METHODOLOGY: A total of 32 consecutive patients with severe cardiorespiratory dysfunction who underwent total parathyroidectomy under LA over a period of 7 years were prospectively accrued in this study. The patient characteristics, the operative outcome and the feasibility to surgery under LA were analyzed.

RESULTS: Sixteen of the patients (50%) had severe restrictive lung disease as a result of renal osteodystrophy and the other 16 patients had poor cardiac status. Histopathological examination confirmed 23 (71.9%) patients had four glands removed and seven (21.9%) patients had three glands removed. Two patients had only two glands removed and had recurrent hypercalcaemia. However, all patients reported symptomatic improvement. The post-operative complications were minimal; one patient had acute coronary syndrome and wound haematoma and another patient had wound haematoma which necessitated exploration under LA. A further patient developed congestive heart failure requiring treatment in the coronary care unit.

CONCLUSION: Total parathyroidectomy can be performed safely and successfully under LA. We believe surgery under LA would be the most appropriate option for selected, high-risk patients to minimise the risk of GA. [*Asian J Surg* 2009;32(1):51-4]

Key Words: LA, parathyroidectomy, renal hyperparathyroidism

Introduction

In Malaysia, end stage renal failure (ESRF) patients are primarily treated with long-term renal replacement therapy (RRT), either in the form of haemodialysis or continuous ambulatory peritoneal dialysis. Renal transplantation is the ideal treatment option but scarcity of cadaveric or live donors limits its role in the Malaysian setting. Many of the ESRF patients surviving on long-term RRT develop renal hyperparathyroidism. Severe osteodystrophy develops in

some of these patients, where bone pain, pathological fracture and muscle weakness eventually confine the patient to bed, with vertebral collapse leading to kyphoscoliosis and restrictive lung disease. These ESRF patients usually have multiple comorbidities, either coincidental or consequent to the renal failure. Thus parathyroidectomy under GA is a challenging and risky undertaking.

In our setting, the majority of the total parathyroidectomy ESRF patients were performed under GA after careful assessment and optimisation. However, there was a

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small number of patients whose general condition were deemed too high-risk to undergo GA. Hypercalcaemia was one of the main contributing factors to the poor general condition of these patients. The only effective way to treat the hypercalcaemia is surgical removal of the hyperfunctioning parathyroid glands. Thus parathyroidectomy was performed under LA. We report our experience in performing bilateral neck explorations and total parathyroidectomies under LA for such patients.

Patients and methods

A total of 32 patients underwent total parathyroidectomy under LA over a period of 7 years, from January 2000 to June 2007. During this period our team performed a total of 393 surgeries for renal hyperparathyroidism. These 32 patients were identified by anaesthetists to have had a very high risk under GA even after optimization. This was a non-randomised prospective study and all patients understood the procedures and risks of surgery under LA and consented to the technique.

We performed all these cases under a local field block and a modified superficial and deep cervical plexus block. The injections were done along the line of incision and the medial borders of sternocleidomastoid muscles. We further infiltrated the strap muscles prior to dividing them transversely. Further infiltration was done whenever necessary as we mobilised the thyroid gland to expose the prevertebral spaces. However, we did not have to give additional injections in most cases.

A field block with 0.5% bupivacaine and adrenaline diluted to 1:200,000 was given in all cases. In addition, light sedative and narcotics were given as necessary to achieve patient comfort and cooperation. The LA used was either 0.25% bupivacaine with adrenaline 1:200,000 or plain 0.25% bupivacaine. The volume of the LA used for each patient varied between 15 to 25 mL. An intravenous sedation (pethidine and/or midazolam) was administered for anxious patients whenever necessary. The patient’s blood pressure, heart rate, respiratory rate and oxygen saturation were monitored throughout the operation. Bilateral neck exploration was performed in the usual manner with surgeons ever mindful about gentle tissue handling and maintaining constant communication with the patient.

In all patients, a bilateral neck exploration and total parathyroidectomy (with or without autotransplantation)¹ was performed. Routine cervical thymectomy was

not performed, unless we were unable to identify the inferior gland confidently. No intra-operative intact parathyroid hormone (iPTH) monitoring or frozen section studies were done for any of the patients. The relevant data were prospectively collected and analysed.

Results

A total of 32 patients (16 males, 16 females) underwent surgery under LA out of 393 cases over the study period. The patient characteristics and the preoperative biochemical profile are as shown in Tables 1, 2 and 3 respectively. Sixteen patients had severe bone disease, resulting in vertebral body collapse and marked kyphosis and restrictive lung disease. Another 16 patients had a variety of cardiac problems ranging from poor left ventricular ejection fractions to severe bradyarrhythmia. No cases were prematurely terminated because of unexpected intra-operative events or patients becoming restless and uncooperative. No conversion to GA was required in our series of patients.

The mean duration of the procedure was 89.4 minutes (range, 30–150 minutes). The average duration of hospital stay before surgery ranged from 2 to 7 days depending

Table 1. Patient characteristics

	Mean (yr)	Range (yr)
Age	45.3	22–64
Duration of renal failure	8.9	2–18

Table 2. Preoperative biochemical profile

	Mean	Range
Serum iPTH	1,336.9 pg/mL	226–4,768 pg/mL
Serum calcium	2.60 mmol/L	2.10–3.09 mmol/L
Serum phosphate	2.16 mmol/L	1.03–3.19 mmol/L
Alkaline phosphatase	759.2 IU/L	870–2,509 IU/L

Table 3. Prevalence of symptoms

Symptoms	Prevalence (% of patients)
Bone pain, joint ache	97%
History of pathological fracture	22%
Muscle weakness, lethargy	11%
Pruritis	3%
Peptic ulcer disease	5%

on the need to optimize the particular patient. The post-operative hospital stay ranged from 4 days to more than 3 weeks, primarily determined by the need for intravenous calcium infusion. All our patients required intravenous calcium in the immediate post-operative period and later converted to oral calcium tablets and alfacalcidol. All patients were discharged with oral calcium supplement and alfacalcidol.

One patient developed acute coronary syndrome and wound haematoma post-operatively; another patient poor left ventricular ejection fraction (LVEF) developed congestive heart failure and was admitted to the coronary care unit. One patient had wound haematoma that required re-exploration under LA. There were no other complications noted.

Histopathological examination confirmed 23 patients (71.9%) had four parathyroid glands removed and seven patients (21.9%) had three glands removed. Two patients had only two glands confirmed histologically. One of the patients had recurrent hypercalcaemia but refused further exploration and was treated medically. The other patient's general condition improved markedly and she underwent re-exploration under GA about 1 year later and the two remaining glands were removed. Among the seven patients whom had three glands removed, one developed recurrent hyperparathyroidism. This patient underwent re-exploration under LA 10 months after initial surgery and the remaining gland was successfully removed.

A symptomatic improvement was reported by all the patients. These include relief of bone pain, feeling stronger, more energetic and the ability to ambulate. However no study was done to objectively assess the change in the bone density.

Discussion

There are many series detailing parathyroid surgery under LA, however, these mainly described surgery for primary hyperparathyroidism.^{2,3} Such surgeries were minimally invasive parathyroidectomy following preoperative localisation of the single lesion with sestamibi scan and/or ultrasonography. It is considered a minimally invasive procedure and can be done even as a day care surgery.

In contrast, total parathyroidectomy for renal hyperparathyroidism is more demanding for patients as well as surgeons. It involves a bilateral neck exploration in order to remove all four glands in patients with multiple

comorbidities. The surgeon needs to be gentle and meticulous during the procedure. It is important to talk to the patient and maintain their confidence, so patients remain cooperative and not unduly distressed and in minimal discomfort.

Though the more popular LA method of parathyroidectomy is superficial or deep cervical block, in our experience, a modified superficial and deep cervical plexus blockage under direct vision in the infiltration of the LA is much desired, beginning with a simple local field block which is effective and adequate for a bilateral exploration. Its anaesthetic effect lasted long enough for exploration that occasionally went beyond two hours. Furthermore, a bilateral blockade is necessary to achieve adequate anaesthesia for total parathyroidectomy.

One important determinant of the favourable outcome was the psychological strength of these patients. The majority of the ESRF patients were 'battle-hardened' patients with vast experience of going through a variety of clinical procedures and surgeries. Since they clearly understood the indication and benefits of using LA and the procedure, they were more willing to proceed and more cooperative.

Overly anxious and uncooperative patients are poor candidates for surgery under LA. Other challenges during such procedures include patients with short stout necks, bulky thyroid glands with nodularities or patients being orthopnoeic and unable to extend their necks for adequate exposure. Thus, careful case selection is essential. The authors are not aware of any series of total parathyroidectomy for renal hyperparathyroidism under LA published in English journals. Meurisse et al described a series of bilateral neck explorations under LA and hynosedation for primary hyperparathyroidism.⁴

As the patients were at high risk if undergoing GA, it is incorrect to assume that surgery under LA is safe. In fact such surgery required similar precautions and standard of care as cases performed under GA. Ideally an anaesthetist should be present at all times to look after the patient throughout the entire procedure, i.e. monitoring sedation. The mean duration of procedure was 89.4 minutes (range, 30–150 minutes). As a comparison, our series of 44 consecutive patients who had total parathyroidectomy under GA in 2007 as opposed to LA, the average duration of surgery was 72.5 minutes (range, 30–150 minutes). This is not surprising as we were more mindful and cautious when performing surgery under local anaesthesia.

The 4-gland excision rate was only 71.9% for our series under LA. However, given the desperate general condition of the patients and constraints of the LA, this procedure can be regarded as salvage procedure or temporary measure. With at least two glands removed, the hypercalcaemia would abate and patients' general condition can be further optimised. The completion surgery may then be performed under GA on a fitter patient, as one of our patients showed.

In our series, complications were minimal and the outcome was satisfactory. All the patients showed an improvement in symptoms like bone pain (the most common symptoms in our series), lethargy and fatigue. The improvement of the general well being of these patients contributed to better quality of life.

Conclusions

Total parathyroidectomy can be done safely and successfully under LA. However bilateral neck exploration under GA is still the preferred strategy for the majority of these

patients. In cases of severe osteodystrophy or poor cardiorespiratory reserve, the patients are unlikely to be optimised adequately for GA, and surgery under LA for bilateral exploration or even unilateral exploration will be the appropriate option. Re-exploration could be done when the patient's condition is further optimised following initial surgery.

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