Journal of Visceral Surgery (2017) xxx, xxx—xxx

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www.em-consulte.com/en

ORIGINAL ARTICLE

Ambulatory surgery under local anesthesia for parathyroid adenoma: Feasibility and outcome

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KEYWORDS
Ambulatory surgery;
Primary hyperparathyroidism;
Parathyroid;
Minimally invasive surgery;
Endocrine tumor

Summary The aim of this study was to evaluate the results of ambulatory parathyroid resection performed under local anesthesia (LA).
Material and methods: Outpatients undergoing parathyroid adenoma resection by a focused approach under LA were included. Results were evaluated by intraoperative serum parathormone levels (ioPTH) and the balance of phosphate and calcium postoperatively, at 3 months, 1 year and at the point date. The quality of ambulatory care was evaluated by the number of cancelled interventions, the number of patients hospitalized after surgery or during the first postoperative month. The patient data manager of the institution carried out a medico-economic analysis.
Results: From 2005 to 2014, 129 patients met the inclusion criteria [women: 82% (sex ratio 1:5), median age: 72 years]. There was no morbidity for 98% of patients. Twelve patients had no statistically significant drop in ioPTH: two had persistent primary hyperparathyroidism (PHP). LA failed in four patients and PTH was late to normalize in six patients. Six patients had recurrent PHP (4.6%), of which two occurred four years after excision. Outpatient treatment was successful in 95%, without deprogramming or rehospitalization. The cost of the treatment under LA and on an outpatient basis was € 2014.90 (vs. € 2581.47 under general anesthesia and traditional hospitalization)
Conclusion: Excision of single parathyroid adenomas can be performed under LA in an ambulatory setting without any major risk for the patient. The risk of recurrence after the focused approach requires regular laboratory monitoring for at least five years.

Primary hyperparathyroidism (PHP) is usually a benign disease but potentially a malignant disease. Untreated PHP doubles the risk of certain cancers (such as breast and colonic) [1,2] and also increases the risk of heart disease and arterial hypertension, while decreasing life expectancy [3]. In about 76% of cases, PHP is due to a solitary parathyroid adenoma. The prevalence of parathyroid cancer is less than 1% [4]. In more than 90% of cases, PHP is sporadic. Multiglandular, double adenoma and hyperplasia represent fewer than 20% of cases [5]. PHP can be part of polyendocrine disease,

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https://doi.org/10.1016/j.jviscsurg.2017.12.002
1878-7886/

such as multiple endocrine neoplasia (MEN-1), usually with multiglandular involvement [6]. Curative treatment is surgical. Starting in the 1990s, sestamibi scintigraphy and technology for rapid parathormone (PTH) assay led to development of the focused approach and excision under local anesthesia (LA). Ever since the initial publications in France by Chapuis et al. in 1996 [7] and in the United States by Norman et al. in 1997 [8], more than 1000 articles dedicated to the focused parathyroid approach have been published today. The safety of this approach and the benefits of LA have been shown.

The use of LA and ioPTH monitoring led to the publication of several large series of ambulatory parathyroidectomy performed under LA starting in the 1990s [9]. In France, parathyroid exploration is most often performed under general anesthesia (GA) via cervicotomy or videoscopy, either with systematic exploration of all four parathyroid sites or by the focused technique. A few teams perform the focused approach under LA.

The goal of our study was to evaluate the short and mid-term results of ambulatory parathyroid excision under LA.

Population and methods

This is a retrospective monocenter observational study on a consecutive series of patients. The retrospective retrieval of data was standardized. The indication for surgery was either symptomatic PHP, or PHP with at least one 2014 NIH criteria present [10]. Preoperative diagnosis of PHP was based on serum calcium levels that were disproportionate to parathormone levels without associated hypocalciuria. Solitary adenoma was affirmed by imaging using cervical sestamibi (MIBI) subtraction scintigraphy combined with ultrasound, both investigations being performed by different operators who were blinded to the other's result. Excision was performed under LA (levobupivicaine) with the focused approach. A short horizontal incision was made in the zone of interest, either in the midline for a lower parathyroid gland, or by an oblique incision along the sternocleidomastoid muscle with a lateral approach for upper parathyroid glands. A rapid ioPTH assay was performed before excision and at 20 and 60 minutes after adenoma removal. The definitive localization of the diseased gland was determined according to the operative report. The pathology report noted weight of the resected tissue and the histology. Calcium and phosphate levels were measured before patient discharge and four days postoperatively. All patients were asked to undergo repeat measurement of calcium and phosphate at three months and one year after surgery. Patients or their referring physicians were contacted by telephone in November 2015.

Patients were treated in a special unit dedicated to ambulatory surgery; available between 7:30 AM and 6:30 PM. Patients were contacted by telephone the evening before and the day following surgery by the same team (Fig. 1). The operations took place in an operating room dedicated to local anesthesia but within the main operative suite. Patients were the taken to the postinterventional surveillance room and could leave the hospital after six hours.

Patients who were eligible for the ambulatory focused approach under LA were selected during preoperative consultation. Selection criteria are indicated in Table 1. Patients with spatiotemporal confusion or those who lived under isolated conditions were not deemed eligible for the ambulatory focused approach (Box 1).

Box 1: Eligibility criteria for focused approach under LA in ambulatory setting

Preoperatively, the patient age and sex were noted. A standard laboratory panel included calcium, phosphate, ionized calcium, PTH. Vitamin D3 (25OH) was also measured preoperatively and at three months and one year. Rapid PTH level was routinely measured intraoperatively after removal of the adenoma. Histologic analysis included the weight of the resected gland and microscopic pathology exam.

- Laboratory proven PHP according to the 2014 NIH criteria [10].
- Solitary adenoma on imaging.
- Sonography and sestamibi findings are concordant or sonography is negative and sestamibi localizes the solitary adenoma.
- Absence of thyroid disease requiring thyroid surgery.
- Patient morphology amenable to the focused cervical approach.
- Elective management of anticoagulant or antiplatelet therapy (as necessary).
- Absence of known allergy to levobupivicaine.
- Patient conscious without spatiotemporal confusion or dementia.
- Presence of accompanying person or patient in an adapted structure (nursing home, residential housing...).
- PHP: primary hyperparathyroidism.

Table 1 Preoperative laboratory testing.

Biochemical parameters	Values
Calcium	2.82 ± 0.07 mmol/L
Phosphate	0.79 ± 0.2 mmol/L
Ionized calcium	1.46 ± 0.13 mmol/L
PTH	93 ± 121 pg/mL
Vitamin (25-OH) D3	18.2 ± 1.3 ng/mL
Creatinine	73 ± 0.2 mol/L
Urinary calcium	450 ± 56 mg/24 h

The results of the management of PHP were evaluated by the change in ioPTH (ΔioPTH) and the evolution of calcium and phosphate levels at three months, one year and the point date. Persistent PHP was defined by ΔioPTH < 50% or by persistence of inappropriate parathormonemia during the first six postoperative months. Recurrent PHP was defined by the discovery of hypercalcemia that was disproportionate to the parathormone level six months postoperatively.

Morbidity of parathyroid surgery was evaluated by the incidence of recurrent laryngeal nerve palsies or paresis and the number of patients with postoperative hypoparathyroidism requiring hospitalization, rehospitalization, or calcium supplementation treatment. Recurrent laryngeal nerve function was evaluated intraoperatively by asking the awoken patients to speak. Recurrent laryngeal nerve morbidity was evaluated by the presence of dysphonia at hospital discharge, or its persistence upon the next-day telephone call or later.

The feasibility of ambulatory management was evaluated by the number of operations cancelled less than 48 hours before their elective scheduled time, the number of patients requiring hospitalization after operation, or who were rehospitalized during the first postoperative month. The medical

Please cite this article in press as: Benhami A, et al. Ambulatory surgery under local anesthesia for parathyroid adenoma: Feasibility and outcome. Journal of Visceral Surgery (2017), https://doi.org/10.1016/j.jviscsurg.2017.12.002