

Conventional Minimally Invasive Parathyroidectomy for Single Parathyroid Adenoma

Cristian Velicescu¹, Radu Danila^{1*}, Alexandru Grigorovici¹, Christina Ungureanu², Cristina Cristea², Alina Gatu², Adi-Ionut Ciomanghel¹ and Dumitru D Branisteanu²

¹Department of Surgery, "St. Spiridon" Hospital Iasi, University of Medicine and Pharmacy "Gr.T. Popa" Iasi, Romania

²Department of Endocrinology, "St. Spiridon" Hospital Iasi, University of Medicine and Pharmacy "Gr.T. Popa" Iasi, Romania

Abstract

Background: Minimally invasive parathyroidectomy is actually the gold standard in the treatment of primary hyperparathyroidism (PHPT) due to parathyroid adenoma (PA).

Material and Methods: A clinical retrospective study was performed on a series of 40 cases operated for pHPT by single PA from January 2013 to March 2015, in the surgical department of the "St. Spiridon" Hospital of Iasi, a referral center for endocrine surgery. Biochemical markers achieved the diagnosis of PHPT and PA was localized using cervical US and MIBI scintigraphy. Conventional minimally invasive parathyroidectomy (C-MIP) was performed in all cases where PA was accurately localised by preoperative imaging, whereas conventional cervical exploration was necessary in cases with concomitant thyroid pathology.

Results: Preoperative localisation findings were concordant with the intraoperative findings, except for one case when conversion to bilateral exploration was deemed and the PA was identified on the other side. In 8 cases, additional thyroid pathology – uni/multinodular goiter and a papillary microcarcinoma imposed a conventional PT adenectomy and concomitant lobectomy/total thyroidectomy. The values of calcemia and PTH decreased significantly postoperatively and reached normal range in all cases. With the exception of a transient recurrent nerve paresis (in a patient with total thyroidectomy), no postoperative morbidity and mortality was encountered.

Conclusion: Conventional mini-incision parathyroidectomy (C-MIP) has an excellent cure rate and minimal morbidity, with a reduced hospital stay and cost compared with the conventional extensive approach.

Keywords: Primary hyperparathyroidism; Minimally invasive parathyroidectomy; Adenoma

Introduction

Primary hyperparathyroidism (pHPT) is defined as symptomatic hypercalcaemia due to excessive parathyroid hormone (PTH) secretion in the absence of secondary or tertiary causes. Although underdiagnosed in the past, the incidence of PHPT rose significantly due to routine determination of serum calcium and accessible PTH measurement combined with routine neck US and longer life span expectancy. Parathyroidectomy is the definitive treatment for primary hyperparathyroidism (pHPT) due to PA [1]. Although classical surgical approach has been cervicotomy with bilateral neck exploration and a four-gland evaluation approach, from the late 90', minimally invasive techniques developed. Directed by accurate preoperative localisation, unilateral exploration and evaluation limited to the site of suspected lesion were successfully performed by video-assisted parathyroidectomy (Micolli, 1997), endoscopic parathyroidectomy (Henry 1999) and conventional (open) mini-incision parathyroidectomy (C-MIP) [2,3]. The aim of the study was to report the initial experience and outcome of C-MIP in the treatment of pHPT due to PA in the IIIrd Surgical Unit.

Material and Methods

A clinical retrospective study was performed on a series of 40 cases operated for pHPT by single PA during January 2013 - March 2015, in the surgical department of the "St. Spiridon" Hospital of Iasi, a referral center for endocrine surgery. Among these, C-MIP was performed in 31 cases whereas bilateral cervical exploration and PA was performed in 9 cases.

Preoperatively, a team composed of endocrinologist, nuclear

medicine specialist, surgeon, anesthetist and pathologist investigated the patients. Biochemical markers achieved the diagnosis of PHPT and PA was localized using cervical US and MIBI scintigraphy. C-MIP was performed in all cases where preoperative imaging accurately localized PA, whereas conventional cervical exploration was necessary in cases with concomitant thyroid pathology. Under general or local anesthesia, a 2-2.5 cm transverse incision was sited over the presumed location of the lesion and the PA was identified and removed by lateral ("back-door") approach, with visualisation of the recurrent laryngeal nerve (RLN). Intra- and postoperative levels of PTH were recorded (after removal of PA and frozen section pathology exam confirmation). No drainage was used, the skin wound was closed with an absorbable intradermic suture and the patients were discharged on postoperative day two.

Surgical procedure was considered successful when intraoperative frozen section confirmed the removal of PT tissue, quick PTH decreased more than 50% of the preoperative value and when normalization of

***Corresponding author:** Radu Danila, MD, PhD, Consultant Surgeon, Department of Surgery, "St.Spiridon" Hospital Iasi, Independentei Street No 1, 700111 Iasi, Romania, Tel: +40 (0) 232 24 08 22; Fax: +40 (0) 232 21 77 81; E-mail: r_danila@yahoo.com

Received February 26, 2015; Accepted April 22, 2015; Published April 29, 2015

Citation: Velicescu C, Danila R, Grigorovici A, Ungureanu C, Cristea C, et al. Conventional Minimally Invasive Parathyroidectomy for Single Parathyroid Adenoma. Journal of Surgery [Jurnalul de chirurgie] 2015; 11(1): 341-343 DOI:10.7438/1584-9341-11-1-6

Copyright: © 2015 Velicescu C, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

PTH and calcium levels occurred postoperatively. PTH was measured by chemiluminescence with Siemens commercial kits compatible with the automatic analyzer Immulite 2000 (Siemens).

A permission of the hospital and “Gr.T. Popa” University of Medicine Ethics Comission was granted for the study.

Results

The patient's demographic data, pre- and postoperative endocrine profile and adenoma characteristics are featured in Table I. The majority of the patients were female (85%) in the age decade 40-50. C-MIP was successfully performed in 31 cases, with a medium operative time of 42 minutes, including the frozen section waiting interval of approximately 20 minutes. Preoperative localization findings were concordant with the intraoperative findings, except for one case when conversion to bilateral exploration was deemed and the PA was identified on the other side. In 8 cases, additional thyroid pathology—uni/multinodular goiter and a papillary micro carcinoma imposed a conventional PT adenectomy and concomitant lobectomy/total thyroidectomy. The values of calcemia and PTH decreased significantly postoperatively within normal range in all cases, as shown in Figure 1 and 2. With the exception of a transient RLN paresis (in a patient with total thyroidectomy), no postoperative morbidity and mortality was encountered.

Discussions

PHPT is a quite common endocrine disorder, which often causes no symptoms, being the most important cause of hypercalcemia. The pathophysiologic basis of PHPT is an excessive secretion of PTH from one or more parathyroid glands which causes raised calcium levels in the blood.

PHPT is diagnosed much more often than before, since determination of calcium in serum became a routine and since the possibility to determine parathyroid hormone values became largely accessible [4]. Before offering parathyroid surgery, the surgeon must carefully review and confirm the preoperative diagnosis to avoid unnecessary surgery. Errors in diagnosis are a major cause of failed initial exploration. The benefits of surgery are obvious for patients with symptomatic hypercalcemia [5].

The combination of hypercalcaemia and elevated serum PTH concentration is decisive in achieving the diagnosis of PHPT. Further on, imagistic studies, consisting of the standard association between cervical US and MIBI scan, may accurately locate the PA and endorse a successful surgical removal, preferably minimally invasive [6]. A successful parathyroidectomy restores serum calcium levels to the normal range; this resolves metabolic complications of hypercalcemia and may also improve symptoms and quality of life. Successful parathyroidectomy also cuts back the accelerated bone loss, reduces the risk of renal stone formation and has an important result in reducing of nonspecific symptoms associated with hyperparathyroidism [7].

The benefits of minimally invasive PT adenectomy are obvious - shorter operating time and hospital stay, a smaller and cosmetically

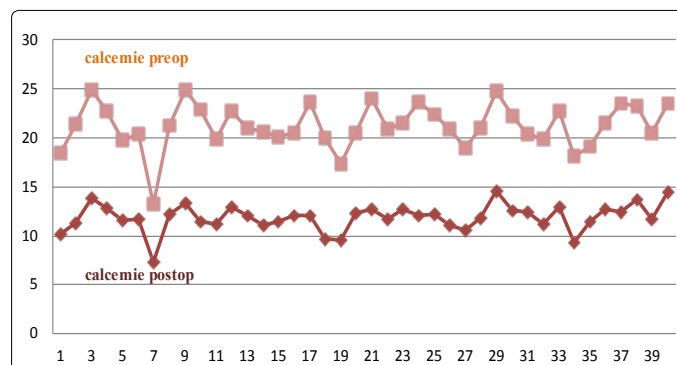


Figure 1: The variation of Calcium pre–and postoperatively (Calcium level in mg/dL).

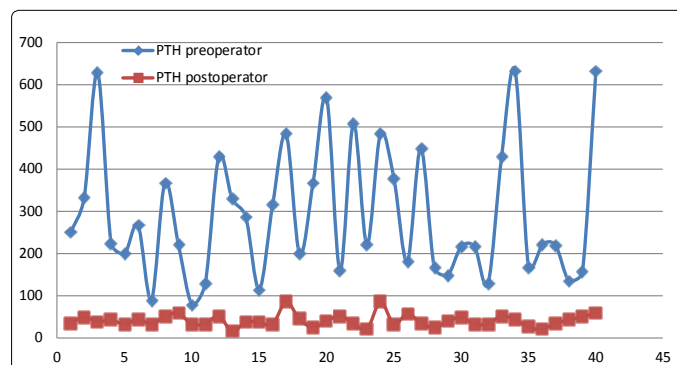


Figure 2: The variation of PTH pre–and postoperatively (PTH level in ng/L).

acceptable wound and overall greater patient satisfaction with similar success rate as the conventional method [8,9]. Precise pre-operative localisation has allowed a rapid development of the video-assisted, endoscopic and radio-guided techniques, but C-MIP remains the most widely used minimally invasive method [10,11]. Another important advantage of C-MIP is the option of local infiltration or regional block anaesthesia in selected cases, thus avoiding the risk of general anaesthesia and intubation, shorter recovery time following the operation, lower post-operative pain and lower incidence of nausea and vomiting [12]. Local anesthesia by infiltration was used in only 4 cases in our series, mainly due to the reticence of the patients for the procedure.

Conclusion

Conventional mini-incision parathyroidectomy (C-MIP) has an excellent cure rate and minimal morbidity, with a reduced hospital stay and cost compared with the conventional extensive approach.

Conflict of interests

Authors have no conflict of interests to disclose.

Acknowledgements

This paper was published under the frame of European Social Found, Human Resources Development Operational Programme 2007-2013, project no. POSDRU/159/1.5/136893

References

- Fraser WD (2009) Hyperparathyroidism. *Lancet* 374: 145-158.
- Miccoli P, Pinchera A, Cecchini G, Conte M, Bendinelli C, et al. (1997) Minimally invasive, video-assisted parathyroid surgery for primary hyperparathyroidism. *J Endocrinol Invest* 20: 429-430.
- Henry JF, Defechereux T, Gramatica L, de Boissezon C (1999) Minimally invasive videoscopic parathyroidectomy by lateral approach. *Langenbecks Arch Surg* 384: 298-301.
- Adler JT, Sippel RS, Chen H (2010) New trends in parathyroid surgery. *Curr Probl Surg* 47: 958-1017.

Table I: Patients and Adenoma characteristics.

N (patients)	40	
Age (years old, mean \pm SD)	45 \pm 5	
Men / Women (N, %)	6 (15%) / 34 (85%)	
Perioperative endocrine profile	Preoperative	Postoperative
Calcium (mg/dL, mean \pm SD)	11.62 \pm 1.337	9.37 \pm 1.315
Parathyroid hormone (ng/L, mean \pm SD)		
Adenoma characteristics		
Weight (g, mean \pm SD)	0.095 \pm 0.037	
Estimated volume (mm ³)	2,197 \pm 0.0379	

5. Ruda JM, Hollenbeak CS, Stack BC Jr (2005) A systematic review of the diagnosis and treatment of primary hyperparathyroidism from 1995 to 2003. *Otolaryngol Head Neck Surg* 132: 359-372.
6. Katz AD, Hopp D (1982) Parathyroidectomy. Review of 338 consecutive cases for histology, location, and reoperation. *Am J Surg* 144: 411-415.
7. Lötscher M, Kaissling B, Biber J, Murer H, Levi M (1997) Role of microtubules in the rapid regulation of renal phosphate transport in response to acute alterations in dietary phosphate content. *J Clin Invest* 99: 1302-1312.
8. Mihai R, Barczynski M, Iacobone M, Sitges-Serra A (2009) Surgical strategy for sporadic primary hyperparathyroidism and evidence-based approach to surgical strategy, patient selection, surgical access, and re-operations. *Langenbecks Arch Surg* 394:785-798.
9. Kelly CW, Eng CY, Quraishi MS (2014) Open mini-incision parathyroidectomy for solitary parathyroid adenoma. *Eur Arch Otorhinolaryngol* 271: 555-560.
10. McGill J, Sturgeon C, Kaplan SP, Chiu B, Kaplan EL, et al. (2008) How does the operative strategy for primary hyperparathyroidism impact the findings and cure rate? A comparison of 800 parathyroidectomies. *J Am Coll Surg* 207: 246-249.
11. Sackett WR, Barraclough B, Reeve TS, Delbridge LW (2002) Worldwide trends in the surgical treatment of primary hyperparathyroidism in the era of minimally invasive parathyroidectomy. *Arch Surg* 137: 1055-1059.
12. Black MJ, Ruscher AE, Lederman J, Chen H (2007) Local/cervical block anesthesia versus general anesthesia for minimally invasive parathyroidectomy: what are the advantages? *Ann Surg Oncol* 14: 744-749.