

Mamun-TKC parathyroid retractor: Parathyroid glands squashed or scooped!

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Abstract

Parathyroid gland by its physiologic and anatomic diversity has interestingly been dealt by multiple specialties, including Urology. Besides primary hyperparathyroidism, urologists in close working relationship with nephrologists, tend to get referrals for tertiary hyperparathyroidism. Data from 1999 to 2012 was retrieved for all parathyroidectomies. Medical record of only cases undergoing parathyroidectomy utilising the instrument Mamun-TKC Parathyroid Retractor were reviewed. It is a metal body surgical instrument resembling Gil Vernet retractor having functional flat metal head attached to solid long handle, designed in two forms; one 'Straight' and other 'Angled' at 30°. During the period, 28 cases of parathyroidectomies were performed. The instrument was used in two cases. It was found to facilitate dissection, retraction and pedicle ligation of parathyroid gland by a-traumatic handling.

Keywords: Parathyroid retractor, Innovation, Parathyroid gland.

Introduction

Endocrine surgery has common principles in terms of maintaining a balance in various positive and negative feedback mechanisms influencing the release of hormones by endocrine glands. But traditionally, lesion in these organs are dealt with by surgeons largely by their diverse anatomic location rather than by generic endocrine surgeons.^{1,2} In Pakistan, endocrine surgery as a specialty may seem to be at a very initial stage at this point.³

Parathyroid gland by its physiologic and anatomic diversity has interestingly been dealt with by multiple specialty, including Urology. In fact, in many instances a urologist may be the first one to detect Parathyroid Adenoma as part of multiple endocrine neoplasia (MEN) syndrome with a high prevalence of chronic urolithiasis.^{4,5} Besides primary hyperparathyroidism, urologists in close working relationship with nephrologists tend to get referrals for tertiary hyperparathyroidism. There are many approaches for parathyroidectomy,

including open and minimally-invasive techniques.⁶ In our centre, we perform parathyroidectomy through traditional open (collar incision) approach. The instrument designed was conceived while in training at The Kidney Centre post-graduate training institute (PGTI). Thus it is named after the author and the institute as Mamun-TKC Parathyroid Retractor.

The purpose of current manuscript is to share the innovation and its initial experience at our institute as encouragement.

Material and Methods

Data related to period from 1999 to 2012 was retrieved for all parathyroidectomies at The Kidney Centre Post-Graduate Training Institute (TKC-PGTI), Karachi. Medical record of only cases undergoing parathyroidectomy utilising the Mamun-TKC Parathyroid Retractor were reviewed. The instrument is a metal (stainless steel) body surgical instrument resembling Gil Vernet retractor having functional flat metal head curved upward with a central partially dividing cleft expanding to a small circular hole with a diameter enough to accommodate parathyroid pedicle. This functional end (head) is attached to a solid long handle as one piece. The instrument is designed in two forms; one 'Straight' and the other 'Angled' at 30° (Figure-1).

Patients were placed supine with head on a ring with neck extended and tilted 20° to 25° downward. Standard collar incision was used to approach the gland. The incision was kept smaller than usual for solitary adenoma, but was bilateral for cosmetic symmetry. The vocal cords were checked at the end of the procedure to exclude recurrent laryngeal nerve damage.

The parathyroid gland after being dissected from the thyroid gland was engaged through its pedicle sliding

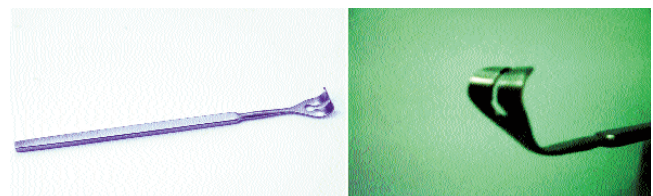


Figure-1: (a) Straight Parathyroid Retractor. (b) Angled Parathyroid Retractor.

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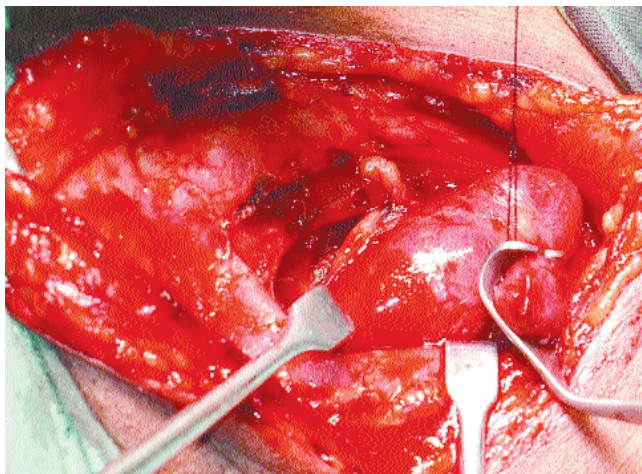


Figure-2: Operative field showing parathyroid gland being engaged within the instrument (Left arrow) and the pedicle being ligated below the instrument (Right arrow).

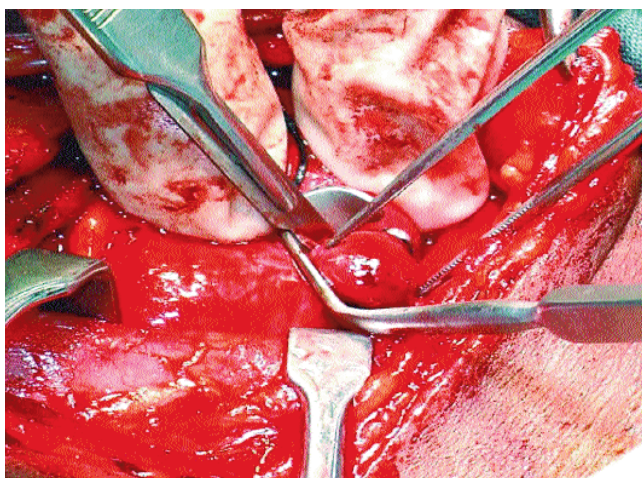


Figure-3: Operative field showing the parathyroid gland being engaged, its pedicle ligated under the head of the instrument (Left arrow) and the gland being flushed over the Angled retractor (Right arrow).

over the cleft into the eye in the head of the instrument. Then its pedicle was ligated below the retractor and finally the gland flushed over the retractor (Figures-2 and 3).

Results

A total of 28 parathyroidectomies were performed during the study period; 5(18%) for primary hyperparathyroidism (primary adenoma), and 23(82%) were referrals for tertiary hyperparathyroidism with bony complications from nephrologists. The Mamun-TKC Parathyroid Retractor was used in 2(7%) cases. Both were identified in the Urology Clinic as recurrent stone former.

Case-1: A 28-year-old male with history of multiple stone passage, including three episodes of acute urinary retention presented with laboratory evaluation showing normal renal function but high serum. Calcium (10.16mg%) and serum Intact parathyroid hormone(IPTH) (123ng/ml). Sestamibiscan was suggestive of single (R) parathyroid adenoma. His post-operative recovery was uneventful and both serum Calcium (8.50mg%) and serum IPTH (49 ng/ml) were normalised.

Case-2: A 45-year-old female who had a history of (R) nephrectomy and (L) pyelolithotomy followed by multiple extracorporeal shock wave lithotripsy (ESWL) sessions, presented with (L) multiple large non-obstructing renal stones. Her serum Calcium was 15.40 mg%, serum Creatinine 1.25 mg% and serum IPTH was 2500ng/ml. Sestamibiscan was suggestive of large lower parathyroid adenoma. Her post-operative recovery was uneventful and serum Calcium came down to 9.10mg%. However, she was lost to follow-up and post-operative IPTH was not available.

Discussion

History reveals that endocrine surgery has predominantly been dealt with by legendary general surgeons like Kocher, Halsted, Lahey, Mayo, Crile and Cope. After half-a-century of having high volume endocrine (thyroid) procedure by Kocher, several surgeons realised the importance of understanding physiology, embryology and pathology of the endocrine system besides technical expertise.⁷ And it is now well established that a surgeon irrespective of his/her specialty domain, has to be responsible far beyond the operating room before and after surgery through multidisciplinary approach. Like other endocrine organs, parathyroid surgery is also performed under various specialties that include urology.¹ In fact, at some instances, urologists may be the first to discover a parathyroid pathology. This is especially true for patients with MEN Type I syndrome. This includes triad of tumours of parathyroid glands, endocrine pancreas and anterior pituitary. Besides, its clinical features may include adrenocortical tumour, carcinoids of foregut origin (bronchial, thymic, gastric and duodenal), and cutaneous tumours as Lipoma, angiofibromas and collagenomas.^{3,8,9} Although there is wide variation in its presentation, but chronic urolithiasis secondary to parathyroid adenoma appears one of the commonest presentations. In a 30-year review study of 143 MEN-1 from Japan reported 90% primary hyperparathyroidism of which 35% complicated into urolithiasis.^{3,10}

First parathyroidectomy was done by Felix Mandl in Vienna in 1925 through traditional collar incision accessing all the four glands.^{4,11} The improved imaging, skill and understanding led to more conservative and minimal access approach. The term

minimal-access or minimally-invasive parathyroidectomy should apply to a parathyroid procedure performed through an incision of less than 2.5cm.¹² This includes Minimally Invasive Parathyroidectomy (MIP), Unilateral Exploration under local anaesthesia (UELA), Focused Lateral Exploration (FLE), Minimally-Invasive Videoscopically Assisted Parathyroidectomy (MIVAP) and Endoscopically Assisted Minimally-Invasive Parathyroidectomy (EAMIP).^{4,12-14}

Irrespective of the approach adopted, dissection and securing fine vessels perfusing the soft friable parathyroid glands may become agonising. The author, while in training, had similar concerns about handling and dissection of parathyroid glands. So it was felt that anything which can engage the gland at pedicle will allow clean and secure control of small vessels either by ligasure or ligation. The instruments already available for this purpose included Dissecting Forceps, Artery Forceps and retractors like Gilvernet. While we take any forceps to hold the parathyroid gland, all were found not only traumatic, but also ineffective, as the gland flips out with every catch. Likewise, the Gilvernet Retractor can only fix the gland to one or other surface in the operating field without any ease in skeletonising and ligating its pedicle. With this thought process, the Gilvernet Retractor was selected for modification. A cleft was created at the functional end of the instrument that in turn expanded at the end to a circular hole accommodating the pedicle. The idea of the instrument was conceived way back in 2004, but it was only in 2011 that a finished design was available for use. It was after a year in July 2012 that the instrument was first used in parathyroidectomy at TKC-PGTI. This was because of low volume of cases. Although we do not have a head-to-head trial as comparison for the instrument designed and the arsenals already available, but certainly initial limited experience suggested a safer and a-traumatic dissection of parathyroid glands with better control. The instrument may have limited value in the face of fast-developing minimally-invasive approaches, including endoscopic and video-assisted ones. However, the instrument will still be found useful by many surgeons performing parathyroidectomy through open approaches or in conditions where endoscopic and video-assisted techniques are not amenable. These include larger adenoma, presence of thyroid nodule, anatomical abnormalities around the neck, chronic obstructive pulmonary disease (COPD) or severe coronary disease.¹² In addition, other surgical specialties may find its scope in small polypoidal pedunculated lesions.

Conclusion

The instrument was found to facilitate dissection, retraction and pedicle ligation of parathyroid gland by a-traumatic handling. It is expected to reduce time by minimising the time spent on holding the gland while pre-empting damage (not assessed in this manuscript).

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References

1. Saunders BD, Wainess RM, Dimick JB, Doherty GM, Upchurch GR, Gauger PG et al. Who performs endocrine operations in United States? *Surgery* 2003; 134: 924-31.
2. Cant P. Fundamentals of endocrine surgery. In *Fundamentals of Surgical Practice: A preparation guide for the intercollegiate MRCS examination*. Kingsnorth A, Bowlay D (eds). New York USA: Cambridge University Press, 2011; pp 378-88.
3. Baloch MN, Aslam A, Ansari MA, Maher M. Surgical Management of Hyper Parathyroidism. *J Coll Physicians Surg Pak* 2007; 17(II): 683-5.
4. Christopoulos C, Antoniou N, Thempeyioti A, Calender A, Economopoulos P. Familial multiple endocrine neoplasia type I: the urologist is first on the scene. *BJU Intl* 2005; 96: 884-7.
5. Miedlich S, Lohmann T, Shneyer U, Lamesch P, Paschke R. Familial isolated primary parathyroidism- a multiple endocrine neoplasia type 1 variant? *Eur J Endocrinol* 2001; 145: 155-60.
6. Palazzo FF, Delbridge LW. Minimal-access/minimally invasive parathyroidectomy for primary hyperparathyroidism. *Surg Clin N Am* 2004; 83: 717-34.
7. Caron NR, Sturgeon C, Clark OH. The Specialist Endocrine Surgeon. In *practical management of Thyroid Cancer*. Mazzaferri EL, Harner C, Mallick UK, Kendall-Taylor P eds. London :Springer London, 2006; pp 121-34.
8. Thakker RV. Multiple endocrine neoplasia type 1. *Endocrinol Metab Clin North Am* 2000; 29: 541-67.
9. Marx SJ, Agarwal SK, Kester MB. Multiple endocrine neoplasia type 1, Clinical and genetic features of the hereditary endocrine neoplasias. *Recent Prog Horm Res* 1999; 54: 397-438.
10. Yoshimoto K. Multiple endocrine neoplasia type 1: from bedside to benchside. *J Med Invest* 2000; 47: 108-17.
11. Mandl F. Therapeutic attempt for osteitis fibrosa generalisata via the excision of parathyroid tumours. *Wein Klin Wochenschr* 1925; 38: 1343-4.
12. Brunaud L, Zarnegar R, Wada N, Ituarte P, Clark OH, Duh QY. Incision length for standard thyroidectomy and parathyroidectomy. When is it minimally invasive? *Arch Surg* 2003; 138: 1140-3.
13. Nakamura K, Tsuchida T, Takeda M, Shiki K, Zakoji H, Komuro M, et al. Endoscopic Parathyroidectomy for Ectopic Primary Hyperparathyroidism-A Minimally Invasive Procedure for Urolithiasis Patient. *Yamanashi Med. J* 2005; 20: 33-6.
14. Udelsman BV, Udelsman R. Surgery in Primary Hyperparathyroidism: Extensive Personal Experience. *J of Clinical Densitometry* 2013; 16:54-9.