



Clinical and Academic Impact of First Endocrine Surgery Unit on a General Surgery Department

Sanjay Kumar Yadav¹ · S. Bharath¹ · Dhananjaya Sharma¹

Received: 12 April 2023 / Accepted: 7 October 2023
© Association of Surgeons of India 2023

Abstract

Endocrine surgery is one of the newest subspecialties of general surgery. We have analyzed the impact of first endocrine surgery unit on a general surgery department. A retrospective study of all endocrine surgical procedures and research output of a teaching surgical department in India was performed. Data was compared between two 3-year periods: before (Jan 2017–Dec 2019) and after (Jan 2020–Dec 2022) the start of a dedicated endocrine surgery unit. The number of surgeries (thyroid, parathyroid, and adrenal), conference presentations, and publications on endocrine surgery went up significantly (<0.05). In addition, newer minimally invasive techniques like endoscopic thyroid and adrenal surgeries were started and became a regular feature. Advent of a new endocrine surgery unit substantially increased the endocrine surgical volume and academic output in the field of endocrine surgery.

Keywords Endocrine surgery · Endoscopic endocrine surgery · Surgical volume · Academic surgery · Residency training

Introduction

Endocrine surgery has evolved into a distinct subspecialty of general surgery in developed countries [1]. However, it is comparatively a recent phenomenon as compared with other surgical subspecialties in India and other low- and middle-income countries (LMICs) [2]. Addition of a trained and dedicated endocrine surgeon to a department has been known to increase volume of endocrine surgery [3] but has not been reported from any LMIC. This prompted us to study the impact of first endocrine surgery unit in a teaching general surgery department.

Method

This retrospective study was performed in a teaching surgical department in India. Data of all endocrine surgical procedures and research output was compared between two 3-year periods: before (Jan 2017–Dec 2019, all procedures performed by different full-time teaching general surgeons)

and after (Jan 2020–Dec 2022, all procedures performed by a trained endocrine surgeon who joined in Jan 2020) starting of a dedicated endocrine surgery unit.

Statistical analysis was performed using unpaired *t*-test to compare the means of endocrine surgeries and academic output during the two periods. Statistical significance was defined as $p < 0.05$ (<https://www.graphpad.com/quickcalcs/ttest2/>).

Results

Twenty-one thyroid surgeries were performed in the first 3-year period which substantially increased to 178 during the second 3-year period ($p = 0.001$; Table 1). Moreover, endoscopic thyroid surgery was started in the second period and 34 patients underwent endoscopic thyroid surgeries (29 by trans-oral endoscopic thyroidectomy vestibular approach and 5 by bilateral axillary approach).

No parathyroid surgery was performed in the first 3-year period; this substantially rose to 28 during the second 3-year period ($p = 0.03$; Table 1), including one trans-oral endoscopic parathyroidectomy.

Three adrenal surgeries were performed (all by conventional open technique) in the first 3-year period which substantially grew to 26 during the second 3-year period ($p =$

✉ Sanjay Kumar Yadav
sky1508@gmail.com

¹ Department of Surgery, NSCB Medical College, Jabalpur, India

Table 1 Surgical volume and academic output in two different 3-year periods

S. no.	Index	2017–2019	2020–2022	Significance
1.	No. of thyroid surgeries	21	178	$p = 0.001$
2.	No. of parathyroid surgeries	0	28	$p = 0.03$
3.	No. of adrenal surgeries	3	26	$p = 0.03$
4.	No. of publications in the field of endocrine surgery	0	15	$p = 0.001$
5.	No. of presentations in conferences			
	State level	1	3	
	National level	0	6	$p = 0.01$
	International level	0	6	

0.03; Table 1). Additionally, minimally invasive adrenal surgery was started in the second period and 11 patients underwent endoscopic adrenal surgeries (four by laparoscopic approach and seven by retroperitoneoscopic approach).

Outcome

Because of incomplete relevant data in many old patient records, we could not compare the data between two periods. However, we have analyzed the outcome of second period. For thyroid surgery, rate of permanent recurrent laryngeal nerve palsy was 0.5%, temporary RLN palsy was 2%, rate of transient hypoparathyroidism was 15%, and permanent hypoparathyroidism was 0% (in 120 patients completed

6-month follow-up). These were zero for parathyroid surgery group with no persistent hyperparathyroidism. For pheochromocytoma and primary hyperaldosteronism surgery group, there were no patients with persistent hypertension and mortality. Three out of eleven patients with inoperable adrenocortical carcinoma expired (Table 2).

Academic Output

One conference presentation but no publications on endocrine surgery were made in the first 3-year period; this substantially increased to 15 peer-reviewed publications and 15 oral/poster presentations in state ($n = 3$), national ($n = 6$), and international ($n = 6$) conferences (Table 3).

Table 2 Outcome analysis of surgeries between 2020 and 2022

S. no.	Index		Mortality	
1.	Thyroid surgeries	Temporary and permanent RLN palsy	Temporary and permanent hypoparathyroidism	
	Benign MNG ($n = 78$)	Nil	12 and nil	Nil
	Toxic MNG ($n = 08$)	Nil	3 and nil	Nil
	Graves disease ($n = 3$)	1 and nil	2 and nil	Nil
	Papillary thyroid carcinoma ($n = 34$)	2 and nil	8 and nil	Nil
	Follicular thyroid carcinoma ($n = 5$)	1 and 1	2 and nil	Nil
	Poorly differentiated thyroid carcinoma ($n = 2$)	Nil	Nil	1
	Benign solitary thyroid nodule ($n = 45$)	Nil	Nil	Nil
	Autonomous functioning thyroid nodule ($n = 3$)	Nil	Nil	Nil
2.	Parathyroid surgeries	Nil	Nil	Nil
3.	Adrenal surgeries			
	Pheochromocytoma and paraganglioma ($n = 10$)	Persistent HTN—nil		Nil
	Hyperaldosteronism ($n = 1$)	Persistent HTN—nil		Nil
	Adrenocortical carcinoma ($n = 11$)	Inoperable—3		3
	Myelolipoma ($n = 3$)	Nil morbidity		Nil
	Adrenal cyst ($n = 1$)	Nil morbidity		Nil

MNG multinodular goiter, RLN recurrent laryngeal nerve, HTN hypertension

Table 3 Surgical volume and academic output of general surgery department and endocrine surgery unit

S. no.	Index	2022
1.	Total no. of major surgeries performed by all units of surgery (excluding endocrine surgery)	3246
2.	Total no. of surgeries performed by endocrine surgery unit	160
3.	Total allocated operation theaters for general surgery	30 per week
4.	Total allocated operation theaters for endocrine surgery	3 per week
5.	Total no. of publications in the field of general surgery (excluding endocrine surgery)	39
6.	Total no. of publications in the field of endocrine surgery	10

Discussion

Our study has shown the impact made by the first endocrine surgery unit, as its advent led to substantial increase in surgical volume of endocrine surgical cases and academic output from its parent general surgery department. An additional advantage was initiation of minimally invasive endocrine surgeries and day-care drainless thyroid surgeries, with their obvious advantages and appeal to the patients, which became a regular feature.

Outcomes of endocrine surgery services are dependent on many factors but most important is the human resources. Availability of a trained endocrine surgeon was the starting point for the success of the unit. Civil infrastructure, the equipment plans, and the machinery required for optimal functioning of the endocrine surgery unit were already available within the general surgery department and no extra funding was allocated. But the real challenge was the establishment of processes and protocols. Well-designed protocols with adequate training and re-training of staff and residents were done to create an environment so that excellence in endocrine surgery services could be offered. The out-patient services were planned, keeping in mind a multidisciplinary approach with radiology and pathology to provide one-stop services. Standard operating procedures were developed to ensure safe and smooth activity for day-care thyroid surgeries and advanced endoscopic surgery services. Recording of the outcomes and quality analysis was kept in place to ensure continuous quality improvement of the services.

The endocrine surgery unit consists of one trained endocrine surgeon, five general surgery trainee residents, and one senior resident. Trainee residents and one senior resident rotate between different surgery units at every 30 days. Unit also caters to breast cases and looks after general surgery emergencies and elective general surgery cases. There is no separate department of endocrine surgery in the institute.

General surgeons were taking care of endocrine surgery workload before the start of this dedicated unit led by a trained endocrine surgeon, and such an increase in surgical workload speaks volumes about the difference made by it.

Moreover, this increase in volume also resulted in increased exposure of general surgery postgraduate residents ($n = 17$ per year) to the scientific knowledge of pathophysiology of endocrine disorders and advancements in diagnostic procedures, imaging, and surgical techniques. This is a big advantage as there are very few recognized centers in LMICs (only 5 recognized centers in India) providing specialized training in endocrine surgery [4]. Such residents, as trained generalists, with increased exposure to endocrine surgery carry their experience and will have great impact on surgical care of the underserved population of patients attending smaller district hospitals [5]. This example supports that evolution of surgical subspecialties is actually an enhancement and not fragmentation of general surgery and those with additional training are an asset to education, research, and clinical operations of any training program in general surgery [6].

Academic impact of the new endocrine surgery unit was a steep rise in state, national, and international level presentations with several of these winning the best presentation awards and international travel grants for general surgery postgraduate residents and the consultant endocrine surgeon. Such a training and mentoring of postgraduate residents amounts to preparing future surgical leaders [7]. Our study highlights the potential clinical and educational value that endocrine surgery unit can provide to academic surgery departments. Most of the endocrine surgeons are working in standalone departments or corporate hospitals in India. Trained subspecialists/superspecialists can work under general surgery departments and bring a positive change.

In addition to these, 15 peer-reviewed publications brought critical acclaim and recognition for the endocrine surgery unit and the parent general surgery department. A special mention must be made of spiritual rewards of developing low-cost model of surgical simulation during COVID-induced slow-down of surgical training, low-cost breast biopsy technique and sentinel lymph node biopsy techniques which can help in ensuring surgical equity in LMICs [8–10].

It is well known that specialized training and surgical volume are associated with reduced incidence of complications and better outcome [11, 12]. By implementing a highly specialized endocrine surgery unit, one would expect a drastic

decrease in complication rates and a parallel increase in radicality and healing rates. Sadly, our study could not make such a comparison because of incomplete relevant data in many old patient records prior to the start of the unit. However, our complication rates are on par with the other highly specialized national endocrine surgery departments of the country [13, 14].

However, despite this limitation, our study shows that advent of a new endocrine surgery unit is a win-win situation in collaborative patient care, surgical volume, postgraduate training, and academic output—both for new endocrine surgery unit and for the parent general surgery department.

Declarations

Competing Interests The authors declare no competing interests.

References

- Sosa JA, Wang TS, Yeo HL, Mehta PJ, Boudourakis L, Udelsman R, Roman SA (2007) The maturation of a specialty: workforce projections for endocrine surgery. *Surgery*. 142(6):876–883. <https://doi.org/10.1016/j.surg.2007.09.005>
- Yadav SK, Mishra SK (2019) Global landscape of endocrine surgery training programmes and the impact of a structured residency programme in India in development of this subspecialty. *Indian J Surg* 81:445–451. <https://doi.org/10.1007/s12262-018-1833-1>
- Iwata AJ, Chang SS, Ghanem TA, Singer MC (2020) Surgical impact of a dedicated endocrine surgeon on an academic otolaryngology department. *Laryngoscope*. 130(3):832–835. <https://doi.org/10.1002/lary.28041>
- Yadav SK, Mishra A, Mishra SK (2022) Building endocrine surgery of tomorrow in India: learning from the past and the present. *Indian J Surg* 84(Suppl 1):126–130. <https://doi.org/10.1007/s12262-021-02980-2>
- Singleton R (2020) The benefits of rural training: producing the expert generalists of the future. *Future Healthc J* 7(1):50–52. <https://doi.org/10.7861/fhj.2019-0071>
- Thompson NW (1996) The evolution of endocrine surgery as a subspecialty of general surgery. Fragmentation or enhancement? *Arch Surg* 131(5):465–471. <https://doi.org/10.1001/archsurg.1996.01430170011001>
- Souba WW (1999) Mentoring young academic surgeons, our most precious asset. *J Surg Res* 82(2):113–120. <https://doi.org/10.1006/jsre.1999.5596>
- Jana S, Yadav SK, Sharma D, Agarwal P (2022) A low-cost model of breast biopsy for the training of surgical residents during COVID-19 pandemic. *Trop Dr* 52(1):107–109. <https://doi.org/10.1177/00494755211050134>
- Yadav SK, Carpenter A, Rai R, Jha CK, Sharma D (2022) Low-cost vacuum assisted core needle biopsy technique for breast lumps. *World J Surg* 46(6):1445–1450. <https://doi.org/10.1007/s00268-022-06475-3>
- Chavda J, Mishra A, Silodia A, Yadav SK, Sharma DB, Sharma D, Khandare M (2022) Validation sentinel lymph node biopsy study in cN0 axilla using low-cost dual dye technique: potential solution for resource poor settings. *Breast Cancer Res Treat* 193(1):105–110. <https://doi.org/10.1007/s10549-022-06556-w>
- Sosa JA, Bowman HM, Tielsch JM, Powe NR, Gordon TA, Udelsman R (1998) The importance of surgeon experience for clinical and economic outcomes from thyroidectomy. *Ann Surg* 228(3):320–330. <https://doi.org/10.1097/0000658-199809000-00005>
- Kohnen B, Schürmeyer C, Schürmeyer TH, Kress P (2018) Surgery of benign thyroid disease by ENT/head and neck surgeons and general surgeons: 233 cases of vocal fold paralysis in 3509 patients. *Eur Arch Otorhinolaryngol* 275(9):2397–2402. <https://doi.org/10.1007/s00405-018-5077-2>
- Mishra A, Agarwal A, Agarwal G, Mishra SK (2001) Total thyroidectomy for benign thyroid disorders in an endemic region. *World J Surg* 25(3):307–310. <https://doi.org/10.1007/s002680020100>
- Yadav SK, Mishra SK, Mishra A, Mayilvagnan S, Chand G, Agarwal G, Agarwal A, Verma AK (2019) Surgical management of primary hyperparathyroidism in the era of focused parathyroidectomy: a study in tertiary referral centre of north India. *Indian J Endocrinol Metab* 23(4):468–472. https://doi.org/10.4103/ijem.IJEM_255_19

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.