

Video-Assisted Parathyroidectomy by a Skin-Lifting Method for Primary Hyperparathyroidism

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ABSTRACT

Objective: The use of endoscopic surgical procedures has rapidly spread to abdominal and thoracic surgeries and subsequently to surgeries of the neck region. Several surgeons initiated endoscopic parathyroidectomy using CO₂ insufflation to create the working space; however, they reported various complications. We describe here a skin-lifting method that may have few complications.

Methods: A 65-year-old man was diagnosed with primary hyperparathyroidism due to a solitary adenoma of the left inferior parathyroid gland. A 3-cm oblique incision was made below the left clavicle, and a 5-mm incision was made on the lateral neck. After the skin was lifted up, we performed video-assisted parathyroidectomy.

Results: Parathyroid extirpation took 2 hours and blood loss was minimal. The patient had minimal pain and no complications postoperatively. Serum concentrations of calcium and intact parathyroid hormone were normalized on the next day.

Conclusion: Using the skin-lifting method, we obtained a sufficient operative view and encountered no complications. This procedure is cosmetically desirable, and we consider it a feasible alternative for the treatment of parathyroid adenoma.

Key Words: Endoscopic surgery, Parathyroidectomy, Skin-lifting device.

INTRODUCTION

Since Mandl reported the first parathyroidectomy in 1925, surgical treatment for primary hyperparathyroidism has been considered the gold standard. In a long-term observational study it has proven to be curative in 95% of patients.¹ However, conventional procedures left wide transverse operative scars in the anterior neck. With the expanded use of video-assisted surgical procedures, several surgeons used endoscopic parathyroidectomy with CO₂ insufflation to achieve less invasiveness and better cosmetic results.²⁻¹⁰ Recently Shimizu et al^{11,12} reported endoscopic thyroidectomy with an anterior neck-lift method, causing a very minimal neck wound. We introduce here the same approach to endoscopic parathyroidectomy and discuss its feasibility and technical issues.

PATIENT AND METHODS

A 65-year-old man was admitted for investigation of hypercalcemia. An elevation of serum calcium had been observed for nine years, but it had not been pursued because no other remarkable signs or symptoms had occurred. He had a 10-year history of urinary tract stones. Laboratory data showed that serum concentrations of calcium and intact parathyroid hormone (PTH) were markedly elevated. Calcium was 3.20 mmol/L (normal range; 2.15 – 2.60 mmol/L), and PTH was 280 pg/mL (10 – 65 pg/mL). An ultrasonographic examination revealed a hypoechoic mass measuring 23x15x11 mm adjacent to the left lower pole of the thyroid gland (**Figure 1**). ²⁰¹Tl – ^{99m}Tc subtraction scintigraphy indicated a single uptake at the same location (**Figure 2**). Computed tomography (CT) and magnetic resonance imaging (MRI) also showed a solitary nodule at the same site. Endocrinological examinations and other imaging studies denied multiple endocrine neoplasm and coexisting nodular goiter. The patient was diagnosed with primary hyperparathyroidism due to a single parathyroid adenoma. After we obtained informed consent from the patient, he underwent video-assisted parathyroidectomy.

The operative procedure was similar to Shimizu et al.^{11,12} The patient received general anesthesia while in the supine position with slight extension of the neck. A 3-cm

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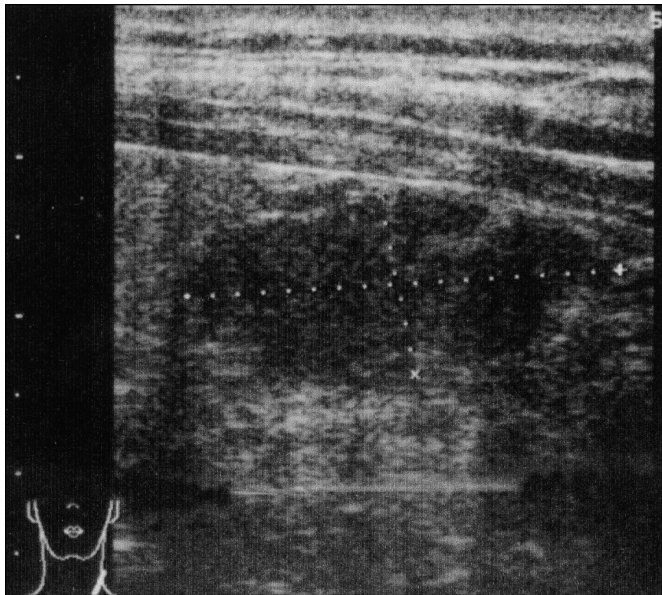


Figure 1. Ultrasonographic examination showed a hypoechoic mass adjacent to the left lower pole of the thyroid gland in the size of 23x15x11 mm.

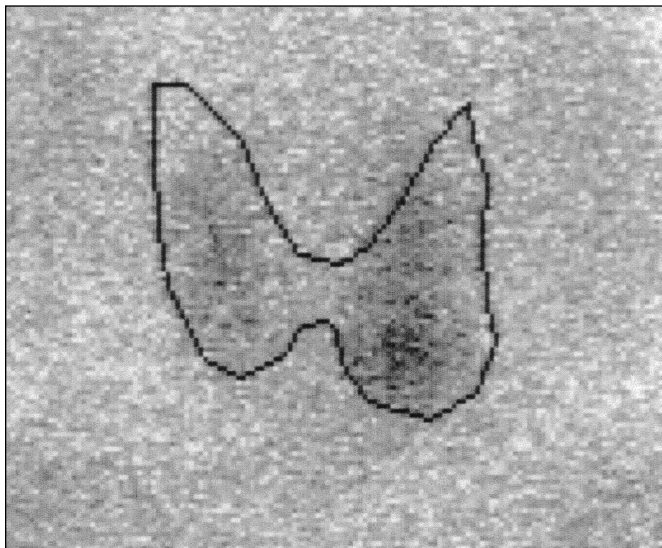


Figure 2. $^{201}\text{Tl} - ^{99\text{m}}\text{Tc}$ subtraction scintigraphy showed a single uptake near the left lower pole of the thyroid gland.

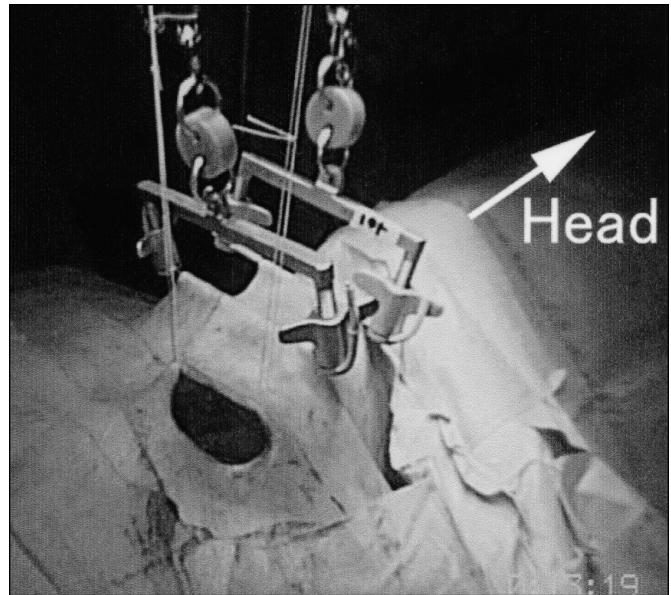


Figure 3. External view of the skin-lifting method. Two sets of Kirschner wires were pushed through the subcutaneous layer. They were lifted up and fixed to the prop to create working space to operate.

oblique incision was made below the left clavicle. Subcutaneous fat tissue was dissected behind the platysma by means of electrocautery or ultrasonic coagulating shears (Harmonic scalpel, Johnson & Johnson, Cincinnati, OH) until the left sternocleidomastoid muscle and strap muscles were exposed. Blunt finger dissection was useful, but care had to be taken not to injure the anterior jugular veins. After two sets of Kirschner wires were inserted transversely in the subcutaneous tissue of the anterior neck, the wires were lifted up and fixed to an L-shaped prop (Mizuho, Tokyo, Japan) to yield a working space (**Figure 3**). Another laterally sited 5-mm incision was made on the same side of the neck for the 5-mm endoscope. A lateral approach to the parathyroid was performed. The left sternocleidomastoid muscle and strap muscles were separated, and the strap muscles were divided transversely with the harmonic scalpel. We used both conventional and laparoscopic surgical instruments for dissection but did not use clips for hemostasis. After exposing the left lower pole of the thyroid gland, the parathyroid tumor was identified and extirpated without explorations of the laryngeal recurrent nerve or the second parathyroid (**Figure 4**). The specimen was immediately prepared for frozen section examination,

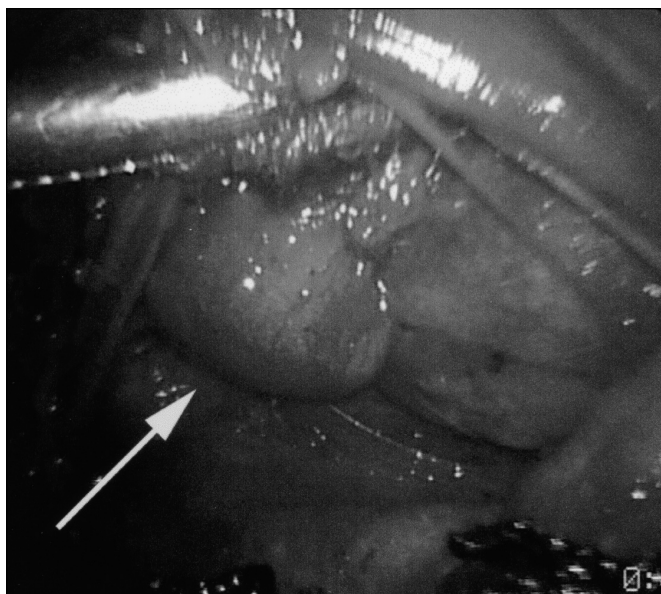


Figure 4. Operative view. Parathyroid adenoma appeared adjacent to the left lower pole of the thyroid gland (arrow).

which revealed parathyroid tissue and no malignancy. The resected specimen was a soft solid mass completely encapsulated measuring 18 x 14 x 9 mm in size and 1.25 g in weight. The divided muscles were subsequently sutured, followed by insertion of a closed suction drain in the resected area. The platysma and skin were closed with absorbable sutures.

The procedure required 2 hours for extirpation of the specimen and 3 hours and 30 minutes for the complete procedure. Blood loss was minimal. The patient had minimal pain and no postoperative complications. Intact PTH decreased to < 2.0 pg/mL the next day and normalized a week after the operation. The final pathological diagnosis was an adenoma of the parathyroid gland.

DISCUSSION

Since laparoscopic cholecystectomy was first reported in 1987, endoscopic surgery has been widely accepted with improving instruments and surgical techniques. This minimally invasive procedure was rapidly adopted for use in various abdominal and thoracic surgeries, and subsequently to closed spaces, such as extraperitoneal or neck regions. Since 1996, several authors have described the

advantages of endoscopic parathyroidectomies.²⁻¹⁰ Miccoli et al⁸ recently reported in their prospective randomized study that postoperative pain was significantly less, and the postoperative inactivity was significantly shorter in video-assisted parathyroidectomy than in conventional surgery. Additionally, patient satisfaction as regards cosmetic results was significantly better in the former procedure. Finally, Naitoh et al⁹ and Yeung et al¹⁰ have noted the advantage of a magnified field of view, which has helped clarify anatomic detail and discriminate important nerves and vessels.

Most previous reports of endoscopic surgery described CO₂ insufflation to create a working space in the anterior neck. However, excessive CO₂ absorption could induce an elevation of end-tidal CO₂ with insufflation pressure above 12 mm Hg.¹⁰ Brunt et al¹³ showed that CO₂ insufflation of the neck could result in pneumomediastinum, pneumothorax, diminution in the pulse, and extensive subcutaneous emphysema in dogs and cadavers. They discontinued establishing a working space with CO₂ and began to use an external lifting device. Naitoh et al⁹ also reported CO₂ related complications, such as subcutaneous emphysema, hypercarbia, and respiratory acidosis. Similar complications were also reported in retroperitoneal surgeries.¹⁴ To overcome these CO₂ related problems, several authors used low-pressure CO₂ insufflation^{6,10} or short CO₂ insufflation with external retractors.⁷

Mechanical elevation has previously been reported to provide a feasible alternative to pneumoperitoneum.¹⁵ In this report, we have discussed a video-assisted parathyroidectomy with the skin-lifting method, which was initiated by Shimizu et al in the endoscopic resection of thyroid tumors.^{11,12} Using this method, we overcame all CO₂ related issues and developed a sufficient operative view. An additional advantage was improved cosmesis. The incisions were made below the clavicle and were completely hidden even with open necked shirts (**Figures 5A and 5B**).

CT and MRI, which are not always necessary for the preoperative evaluation, were added to help localize the adenoma. In addition, we believe that the long operative time will improve with experience.

This report demonstrates the feasibility of endoscopic parathyroidectomy using a skin-lifting method. There were no CO₂ related problems and we secured an adequate operative view. This procedure yielded an excel-



Figure 5A. Operative scars on the seventh day after operation: A 3-cm oblique incision was seen under the clavicle. A 5-mm incision on the lateral neck is barely visible.



Figure 5B. An oblique incision was completely covered by open-necked shirts. No scars appeared in the exposed anterior neck.

lent cosmetic result and is an excellent option for the treatment of parathyroid adenoma when preoperative imaging modalities demonstrate accurate localization.

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