Contemporary Surgical Techniques

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KEYWORDS

• Thyroid surgery • Thyroid cancer • Endoscopic • Robotic • Minimally invasive

KEY POINTS

- Two divergent paradigms have developed for reducing the cosmetic burden of thyroid surgery: minimally invasive anterior cervical approaches and remote access approaches.
- Minimally invasive cervical approaches use small incisions on the anterior neck for direct access to the thyroid compartment and require limited dissection to remove the thyroid gland.
- Remote access approaches use well-hidden incisions but should not be considered minimally invasive, given the increased extent of dissection required and the resultant prolonged recovery compared with that of minimally invasive anterior cervical approaches.
- These alternative approaches have been applied to small, low-risk, well-differentiated thyroid cancers with promising and oncologically appropriate results. Careful patient selection and comprehensive preoperative counseling is essential.

INTRODUCTION

Conventional thyroidectomy techniques, although appropriate in some cases, yield a conspicuous anterior cervical scar that may be difficult to camouflage. Patient-driven motivations to decrease the cosmetic impact of thyroid procedures have generated procedures that aim to minimize the visible scar and improve postoperative recovery. Two distinct pathways have emerged from these efforts. One track created minimally invasive anterior cervical approaches that strive to decrease the incisional length and extent of dissection while providing direct and anatomically familiar access to the thyroid gland. The other developed remote access techniques that approach the thyroid gland from extracervical vantage points using endoscopic and robotic assistance, consequently removing the thyroidectomy scar from the visible neck. For the appropriate patients, these are viable techniques that accomplish both the surgical and cosmetic goals. The role of these procedures in treating malignant thyroid disease has been recently evaluated.

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BACKGROUND AND HISTORY

In the late 1800s, Emil Theodor Kocher revolutionized the field of thyroid surgery, transforming the thyroidectomy from a perilous operation with sometimes dire consequences to a validated and accepted procedure. For more than a century, his traditional method, which involved a large 7- to 10-cm transverse cervical incision, elevation of subplatysmal flaps, and routine postoperative drainage and inpatient care, was routinely performed.[1] The development and widespread utilization of endoscopic and minimally invasive techniques in other surgical fields provoked interest in their application to neck surgery. In 1996, Gagner[2] described the first endoscopic cervical surgery, using multiple ports and CO_2 insufflation to perform a subtotal parathyroidectomy. Although the cosmetic outcome was ostensibly excellent, the procedure took 5 hours, produced mild hypercarbia and significant subcutaneous emphysema, and necessitated a 4-day inpatient admission.[3] This experience, while demonstrating issues that would need to be overcome before these techniques could be widely used, elicited the attention of patients and surgeons to the possibility of alternative approaches to the thyroid compartment.

These alternative approaches developed along 2 avenues: minimally invasive and remote access approaches (**Table 1**). Along the minimally invasive anterior cervical pathway, both minimally invasive video-assisted thyroidectomy (MIVAT)[4,5] and minimally invasive nonendoscopic thyroidectomy (MINET)[6] were cultivated. These approaches camouflage incisions that are significantly smaller than those of a conventional thyroidectomy in natural neck creases and reduce the extent of dissection, obviating postoperative drainage and reducing postoperative pain. Not only is the cosmetic impact reduced but also outpatient surgery becomes feasible with these techniques.[7] The other pathway pursued remote access approaches that primarily emerged in Asian practices, tailored to a population at increased risk of hypertrophic scarring and highly cognizant of postoperative cosmesis.[8,9] Although not completely scarless, these techniques eliminate any scar from the visible neck by accessing the thyroid compartment by way of a more distant but concealed site. Consequently, more extensive dissection is required and anatomic structures not otherwise

Table 1
Alternative approaches to the thyroid compartment

Approach	Incision Site	Technique
Minimally invasive anterior cervical	Anterior neck	1. MIVAT 2. MINET
Remote access	Chest or breast	1. CO_2 assisted • Endoscopic 2. Gasless • Endoscopic • Robotic
	Axillary	1. CO_2 assisted • Endoscopic 2. Gasless • Endoscopic • RAT
	Combined	1. ABBA 2. BABA • Endoscopic • Robotic
	Postauricular	1. RFT