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How I do it

Minimally invasive video-assisted functional lateral neck dissection for metastatic papillary thyroid carcinoma

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Abstract

Functional lateral neck dissection requires a large incision providing adequate exposure of the surgical field. We evaluated the feasibility of minimally invasive video-assisted functional lateral neck dissection (VALNED) in patients with papillary thyroid carcinoma (PTC). Low-risk PTC patients with lateral neck metastases <2 cm, in absence of any evidence of great vessels involvement, were considered eligible. After accomplishing total thyroidectomy and central neck clearance, dissection was performed under endoscopic vision by using a technique very similar to conventional surgery through the single 4-cm skin incision used for thyroidectomy. Two patients were selected: 1 underwent bilateral and 1 unilateral VALNED. The mean number of the removed nodes was 25 per side. Both patients experienced transient postoperative hypocalcemia. No other complication occurred. No evidence of residual or recurrent disease was found at follow-up. VALNED is feasible, and the results are encouraging. For definitive conclusions, larger series and comparative studies are necessary.

Keywords: Video-assisted lymph node dissection; Video-assisted functional lateral neck dissection; Video-assisted modified radical neck dissection; Papillary thyroid carcinoma; Minimally invasive surgery; Video-assisted surgery

The prognostic significance of lymph node metastases in patients with papillary thyroid carcinoma (PTC) is still controversial. However, a therapeutic neck dissection is indicated in patients with clinically evident lymph node involvement. The most common procedure today includes modified radical neck dissection (MRND), preserving the sternocleidomastoid muscle, the accessory nerve, and the internal jugular vein [1].

Despite the L-shaped, reverse L-shaped, and the U-shaped (apron) incisions are today avoided because of the unsightly scar in the neck, MRND for PTC is usually performed through a large transverse incision (extended collar incision) 2 to 3 cm above the sternal notch extended to the posterior edge of the sternocleidomastoid muscle or to the anterior border of the trapezius muscle on the affected side [1,2]. Occasionally, in selected patients, a MacFee incision (a separate high horizontal incision) may be useful for better clearance of the lymph nodes at level II [1,2].

In recent years, there was a wide development of several minimally invasive techniques for thyroid and parathyroid surgery to improve primarily the cosmetic results of neck surgical procedures. Among these techniques, video-assisted thyroidectomy became a valid option for the surgical treatment of selected patients with thyroid nodules [3,4]. This procedure has been proposed also for "low-risk" PTC, and comparative series showed the validity and safety of video-assisted approach [4,5]. Preliminary studies have been also published on the feasibility of video-assisted central neck lymph node dissection in case of PTC [6].

Based on this background and on the experience we gained with video-assisted neck procedures, we decided to approach, by a video-assisted technique, the lateral neck compartments in low-risk patients [7] with lateral neck metastases of PTC, with the primary aim to improve the cosmetic result of conventional lateral neck dissection. We developed a procedure for minimally invasive video-assisted lateral neck dissection (VALNED) through a conventional small (4-cm) cervicotomy by using a technique very similar to conventional surgery. Herein, we describe the procedure we use and discuss about its preliminary results.

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Materials and Methods

Selection criteria

Low-risk PTC patients [7] with lateral neck metastases <2 cm in their maximum diameter without evidence of great vessels involvement at preoperative workup are considered eligible for VALNED. Low-risk patients include patients with small (<4 cm) T1-T2 papillary thyroid carcinoma, age <45 years, and without distant metastases [7].

Surgical procedure

The procedure is performed under general anesthesia via orotracheal intubation. A 4-cm cervicotomy is performed between the cricoid cartilage and the sternal notch. After accomplishing the total thyroidectomy (TT) and the central neck clearance (level VI) (central neck dissection [CND]) by a conventional procedure, the lateral neck compartment is approached.

A 5-mm 30° endoscope is used for vision. Two or 3 small conventional (Farabeuf) retractors are used to maintain the operative space (Fig. 1). No trocar is used, as already described for video-assisted thyroidectomy. The endoscope is inserted in the operative field through the single horizontal 4-cm skin incision. One of the assistants handles the endoscope with 2 hands. Special instrumentation derived from ear, nose, and throat and plastic surgery (forceps, scissors, spatulas, and spatula-shaped aspirator) and conventional instrumentation are both used for dissection. Harmonic Scalpel (Ethicon ENDO-SURGERY, Inc, Cincinnati, OH) is very useful for dissection and to achieve the hemostasis. In some circumstances, conventional bipolar cautery and conventional ligature may be useful or even preferable.

As usual, the limits for lateral neck dissection in PTC are represented by the medial border of the sternocleidomastoid muscle (SCM) anteriorly, the carotid sheet medially, the anterior border of the trapezius muscle laterally, the scalenus anterior and the scalenus medium posteriorly, the posterior belly of the digastric muscle superiorly, and the clavicle and the subclavian vessels inferiorly (levels II-III-IV and part of V) [2,8].

Fig. 1. VALNED. No trocar is used. Two or 3 small conventional (Farabeuf) retractors are used to maintain the operative space.

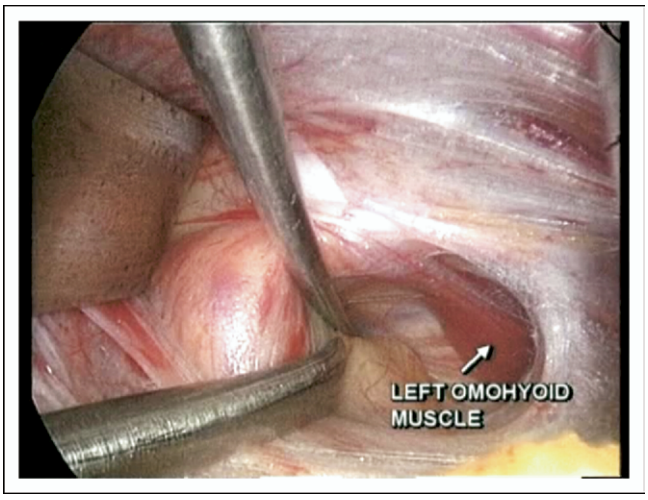

Fig. 2. VALNED. Traction over the sternocleidomastoid muscle (SCM) is oriented laterally so to expose the omohyoid muscle, which is dissected and sectioned to have wide access to the lateral compartment.

The medial border of the SCM and its investing fascia are first dissected. Traction over the SCM is then oriented laterally so to expose the omohyoid muscle, which is dissected and sectioned to have wide access to the lateral compartment (Fig. 2). After sectioning the omohyoid muscle, traction over the strap muscles (sternothyroid and sternohyoid muscles) is oriented medially. The endoscope is oriented cranially. The carotid sheet is then opened, and the common carotid artery, the internal jugular vein (IJV), and the vagus nerve are exposed, well above the carotid bifurcation cranially and the subclavian vessels inferiorly. Carotid and prejugular nodes are retracted laterally by using conventional forceps. The *ansa cervicalis* is quite easy to identify and spare thanks to the magnification of the endoscope. After being completely exposed, the IJV is retracted medially and downward by a conventional retractor. Dissection is continued cranially under endoscopic vision to expose the posterior belly of the digastric muscle and the submaxillary gland. The spinal accessory nerve is then sought for and identified (Fig. 3). During this step of the procedure, the endoscope is oriented cranially. The endoscope is particularly useful during this step of the procedure, allowing for a very good identification of all neck structures high in the neck. The IJV is still retracted medially and the SCM laterally by using Farabeuf retractors. After identifying and dissecting the spinal accessory nerve, the lymph nodes are retracted downward. The anterior and the middle scalenus muscles are exposed as well as the phrenic nerve (Fig. 4). The cervical plexus is exposed as well. The endoscope is then oriented downward to expose the inferior border of the dissection and to accomplish the lateral neck dissection. The subclavian vessels are exposed. On the left side, thanks to the magnification of the endoscope, it is possible to identify the thoracic duct where it enters the brachiocephalic vein and to safely ligate it when necessary (ie, leak, inadvertent lesion, and so on). The lymph nodes are then retracted medially and the endoscope oriented laterally to expose the lateral border of the dissection and completely detaching the specimen. The lateral neck lymph