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TECHNIQUE

Minimally invasive video-assisted lateral lymphadenectomy: a proposal

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In 1998, we set up a new operation we called minimally invasive video-assisted thyroidectomy (MIVAT). The MIVAT procedure involved gasless minimally invasive access to the thyroid gland characterized by external retraction, magnified endoscopic vision, and dissection by means of needlescopic and ultrasonic devices. This technique proved to be feasible, as safe as traditional surgery, and viable for the treatment of small thyroid nodules [1]. Later, it was used also to approach "low-risk" papillary carcinomas after demonstrating its ability to achieve thyroidectomy completeness for these patients [2]. Finally, the attempt to perform endoscopic central node compartment clearance via the same minimal access was accomplished, and the entire procedure proved to be viable and oncologically correct for dealing with a prophylactic total thyroidectomy in RET gene mutation carrier patients [3].

Recently, the spreading and continually strengthening concept that a selective approach to lateral cervical lymph nodes for papillary carcinoma might be a successful alternative to the routine modified neck dissection [4, 5], convinced us to find a proper approach for developing a minimally invasive video-assisted approach to the lateral compartment of the neck in addition to MIVAT for patients who proved to have enlarged lateral lymph nodes at ultrasonography.

Patient selection

For Minimally Invasive Videoassisted Lateral Lymphadenectomy (MIVALL), patients are selected who have small papillary carcinomas (<2 cm) diagnosed by means of fine-needle aspiration cytology and ipsilateral lateral lymph node suspicious for metastatic lesion at preoperative ultrasonography. The patients are scheduled to undergo MIVAT before undergoing a MIVALL.

Technique

The procedure comprises lymphadenectomy of the lateral compartment via a lateral video-assisted approach.

Patient position

The patient, under general endotracheal anesthesia, is positioned in supine position. The neck is not extended but is slightly rotated on the opposite side as during conventional lymphadenectomy. The skin is protected by means of a sterile film (Tegaderm, Bioclusive © Johnson & Johnson, Gargrave, Skipton, UK).

Operating room setup

The first operator stands on the side of the lateral compartment where suspicious lymph nodes have been diagnosed by ultrasound. The second and third assistants stand on the opposite side.

Instrumentation

The instrumentation during the operation involves the following:

- Forward-oblique 30° telescope 5 mm in diameter and 30 cm long

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- Suction dissector, 21 cm long, blunt with a cutoff hole that has a stylet
- Ear forceps, very fine, serrated, with a working length of 12.5 cm
- Small tissue retractors, double-ended, and 12 cm long
- Large retractors designed for MIVALL
- Clip applier for vascular clips
- Straight scissors 12.5 cm long
- Ultrasound generator
- Single screen (double screen can be useful, but is not mandatory)
- Electrocautery (monopolar).

Operative technique

Two accesses are used. The first main access is the same as that used shortly before for MIVAT. A 1.5-cm central transverse incision is performed two fingers above the sternal notch. Through the central incision, under direct vision, the fascia on the medial border of the sternocleidomastoid muscle is incised, and by blunt dissection, the sternocleidomastoid muscle and strap muscles are progressively separated.

Two small retractors are used in this preliminary step to gain the superficial operative space. When the jugular vein and carotid artery come into direct vision, the small retractors are replaced by larger and deeper retractors, which allow maintenance of the operative space for the remainder of the procedure via pulling of the vascular trunk medially and the sternocleidomastoid muscle laterally (Fig. 1). These deeper retractors differ from the army–navy type used during MIVAT and were designed purposely to perform MIVALL. They are characterized by a 9-cm-long branch and a larger handle to balance the length of the vertical branch.

All instruments except the endoscope are introduced through this main access, whereas the camera is inserted into the operative space through the second access. This second incision (length, 5–7 mm) is made along the posterior border of the sternocleidomastoid muscle at median level (just below the omojoideus muscle) (Fig. 2).

At this point, the lateral 5-mm trocar is introduced under direct vision of the endoscope and temporarily held through the main central incision (Fig. 3). The endoscope then can be reintroduced in the operative space and held through the trocar, allowing frequent extraction of the instrument for cleaning and easy rotation on 180° axis. Its view is opposite the jugulocarotid chain, or up to the digastric muscle (apex of the lymphadenectomy) and down to the supraclavicular space (lower boundary of the lymphadenectomy). Now, a modified lateral lymphadenectomy can be performed via the needlescopic instruments already used for MIVAT: spatula, spatula sucker, small forceps and scissors for dissection as well as the Harmonic Scalpel, and vascular clips for hemostasis.

The lymphatic tissue together with the adipose tissue surrounding it is progressively dissected from the posterolateral aspect of the jugulocarotid chain to the medial border of the sternocleidomastoid muscle and from the

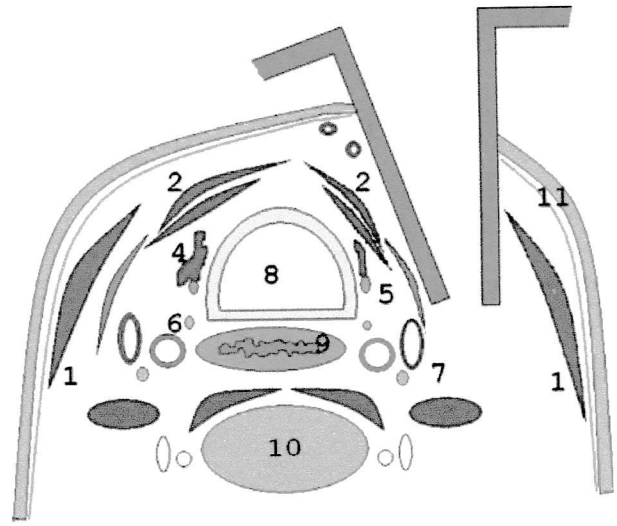

Fig. 1 Retractors allow maintenance of the operative space during the entire procedure. By means of these retractors, the sternocleidomastoid muscle is pulled laterally while the strap muscles and vascular trunk are pushed medially. (1) sternocleidomastoid muscle, (2) strap muscles, (3) anterior giugular vein, (4) thyroid bed after thyroidectomy, (5) parathyroid gland, (6) inferior laryngeal nerve, (7) neurovascular trunk (internal giugular vein, carotid artery, vagus nerve), (8) trachea, (9) esophagus, (10) vertebra, (11) platisma

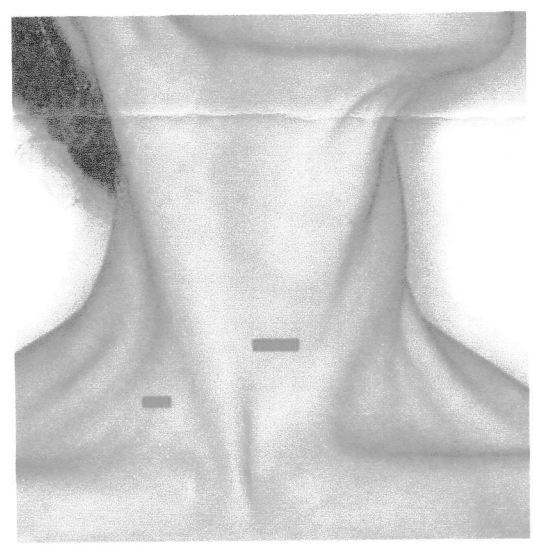

Fig. 2 The first access is a 1.5-cm central transverse incision two fingers above the sternal notch. The second incision (5–7 mm long) is performed along the posterior border of the sternocleidomastoid muscle at median level (just below the omojoideus muscle)

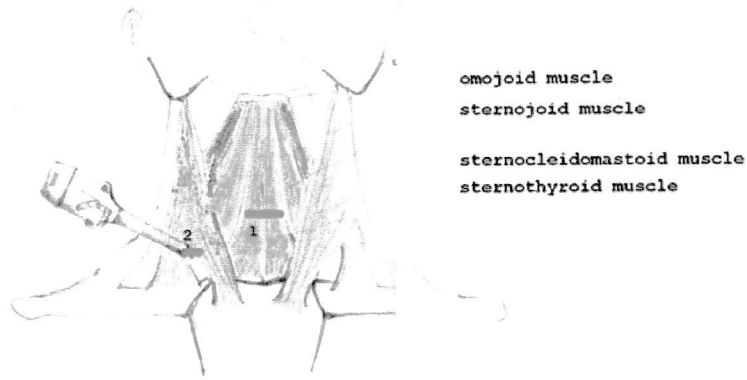

Fig. 3 Anatomic schema of the double access for minimally invasive video-assisted lateral lymphadenectomy (MIVALL). The main incision (1), transverse and 1.5 cm in length, is performed 2 cm above the sternal notch. The second incision (2), transverse and 5 mm in length, is performed just below the omojoid muscle on the posterior border of the sternocleidomastoid muscle

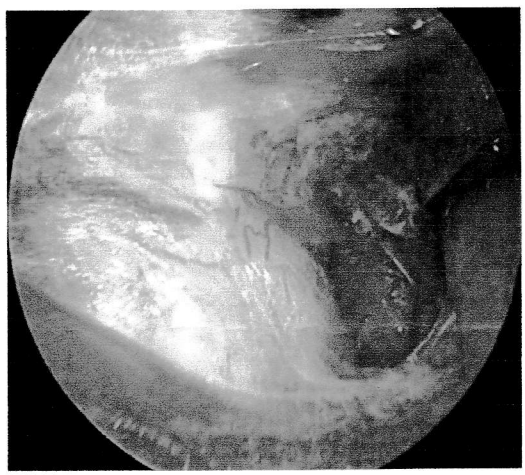

Fig. 4 Intraoperative endoscopic view of the vascular trunk (*left side*) during minimally invasive video-assisted lateral lymphadenectomy (MIVALL). An enlarged lymph node is clearly visible lateral to the upper part of the internal jugular vein

Fig. 5 Intraoperative endoscopic view of the vascular trunk (*left side*) during minimally invasive video-assisted lateral lymphadenectomy (MIVALL). An enlarged lymph node is clearly visible lateral to the upper part of the internal jugular vein

supraclavicular space upward to the apex (Figs. 4 and 5). Adipose tissue can be coagulated and sectioned using the Harmonic Scalpel while main tributaries of the jugular vein are sectioned between vascular clips. The specimen finally is removed en bloc through the main access. Endoscopic magnification allows nerve structures such as the phrenic nerve and the accessory nerve to be identified and handled with care.

After removal of the specimen, the lateral trocar is extracted. No drain is necessary, and wounds are closed by reabsorbable stitches and skin glue (Fig. 6).

Case series

To date, two women presenting with enlarged lymph nodes of the lateral compartment suspicious for metastases from papillary carcinoma have undergone MIVALL. The ages of the patients were, respectively, 34 and 28 years. The first patient had already undergone minimally invasive video-assisted total thyroidectomy 1 year earlier. The second patient was submitted to the combined MIVAT and MIVALL procedure in one step. In both cases, the enlarged lymph node chain was on the right side. The mean operative time for MIVALL alone was 60 min in both cases.

Neither vocal cord palsy nor hypoparathyroidism was registered in these cases at discharge. The patients were given 30 mCi of radioactivated iodine 1 month after surgery. After 6 months, whole body scanning showed no uptake of the iodine. Neither the thyroglobulin serum value nor antithyroglobulin antibodies were detectable after removal of the suppressive therapy by levothyroxine.

Fig. 6 Final result after minimally invasive video-assisted lateral lymphadenectomy (MIVALL). The skin is closed by reabsorbable stitches and skin glue

Histology confirmed the presence of a papillary carcinoma in both cases. The number of nodes removed was eight in the first case (4 of 8 metastatic nodes) and nine in the second case (3 of 9 metastatic notes). The largest diameter of a removed metastatic lymph node was 2 cm. After 6 months, the scars were scarcely visible, and both patients declared that they were very satisfied with the cosmetic result.

Conclusion

The MIVALL procedure may be considered a viable option to associate with MIVAT when a lateral lymph node dissection is advisable for young women particularly concerned with cosmetic outcome. In fact, this procedure could allow avoidance of a collar incision otherwise necessary for performance of a traditional total thyroidectomy and a unilateral modified lymph node dissection [6]. Careful patient selection is necessary, and a full oncologic workup should be done after an adequate follow-up period before validation of this procedure, which currently is still considered experimental.

References

1. Miccoli P, Materazzi G (2004) Minimally invasive video-assisted thyroidectomy (MIVAT). Surg Clin North Am 84:735–741
2. Miccoli P, Elisei R, Materazzi G, Capezzone M, Galleri D, Pacini F, Berti P, Pinchera A (2002) Minimally invasive video-assisted thyroidectomy for papillary carcinoma: a prospective study of its completeness. Surgery 132:1070–1073, discussion 1073–1074
3. Miccoli P, Elisei R, Berti P, Materazzi G, Agate L, Castagna MG, Cosci B, Faviana P, Ugolini C, Pinchera A (2004) Video-assisted prophylactic thyroidectomy and central compartment nodes clearance in two RET gene mutation adult carriers. J Endocrinol Invest 27:557–561
4. Caron NR, Tan YY, Ogilvie JB, Triponez F, Reiff ES, Kebebew E, Duh QY, Clark OH (2006) Selective modified radical neck dissection for papillary thyroid cancer: is level I, II, and V dissection always necessary? World J Surg 30:833–840
5. Dzodic R (2006) Sentinel lymph node biopsy may be used to support the decision to perform modified radical neck dissection in differentiated thyroid carcinoma. World J Surg 30:841–846
6. Clark OH, Duh QY, Kebebew E (2005) Textbook of endocrine surgery. 2nd ed. Philadelphia: Elsevier Inc.