Robot-Assisted Sistrunk’s Operation, Total Thyroidectomy, and Neck Dissection via a Transaxillary and Retroauricular (TARA) Approach in Papillary Carcinoma Arising in Thyroglossal Duct Cyst and Thyroid Gland

Hyung Kwon Byeon, MD, Myung Jin Ban, MD, Jeon Mi Lee, MD, Jong Gyun Ha, MD, Eun Sung Kim, MD, Yoon Woo Koh, MD, PhD, and Eun Chang Choi, MD, PhD

Department of Otorhinolaryngology, Yonsei University College of Medicine, Seoul, Republic of Korea

ABSTRACT

Background. Carcinomas arising in the thyroglossal duct cysts are rare, accounting only for about 0.7–1.5 % of all thyroglossal duct cysts.1–3 Synchronous occurrence of thyroglossal duct carcinoma and thyroid carcinoma is reported to be even rarer.4 Traditionally, surgical treatments of such coexisting thyroglossal duct cyst carcinoma (TGDCa) and papillary thyroid carcinoma (PTC) were typically performed through a single transverse or double incisions on the overlying skin. A longer, extended cervical incision might be required if neck dissection is necessary. Though this method provides the operator with the optimal surgical view, the detrimental cosmetic effect on the patient of possessing a scar cannot be avoided, despite the effort of the surgeon to camouflage the scar by placing the incision in natural skin creases. Recently, the authors have previously reported the feasibility of robot-assisted neck dissections via a transaxillary and retroauricular (“TARA”) approach or modified face-lift approach in early head and neck cancers.5,6 On the basis of the aforementioned surgical technique, we demonstrate our novel technique for robot-assisted Sistrunk’s operation via retroauricular approach as well as robot-assisted neck dissection with total thyroidectomy via transaxillary approach.

Methods. This is a case presentation of a 22-year-old woman with synchronous TGDCa and PTC with minimal lymph node metastasis who underwent resection of TGDCa and total thyroidectomy with left neck level III and IV lymph node dissection as well as central compartment lymph node dissection (CCND) via TARA approach with a robotic surgery system after approval from the institutional review board at Severance Hospital, Yonsei University College of Medicine. The incision was just like the TARA approach in head and neck cancer, which has been reported by our institute.6 The operation was proceeded as follows. First, excision of the TGDCa through the retroauricular incision was done followed by total thyroidectomy with CCND via transaxillary approach. Finally, neck dissection of left level III, IV was conducted via transaxillary approach. The da Vinci surgical system (Intuitive Surgical, Sunnyvale, CA) was introduced via retroauricular or transaxillary port. A 30° dual-channel endoscope was used, and the two instrument arms were equipped with 5 mm Maryland forceps and a 5 mm spatula monopolar cautery for TGDCa excision via retroauricular approach. When conducting total thyroidectomy and neck dissection via transaxillary approach, three instrument arms were utilized, each equipped with 5 mm Maryland forceps, ProGrasp forceps and a 5 mm spatula monopolar cautery or Harmonic curved shears. The rest of the surgery was completed with the robotic system (see Video).

Results. The operative procedure was successfully completed utilizing the robotic surgical system with no conversion to open surgery. The operation time for TGDCa excision was 97 min, including the time for skin flap elevation (15 min), setting up the robotic system (5 min), and console time using the robotic system (77 min). Also, the total operation time for the consecutive total thyroidectomy
with CCND and level III, IV dissection was 142 min including the time for skin flap elevation (27 min), setting up the robotic system (3 min), and console time using the robotic system (112 min). There were no intraoperative complications. The retroauricular approach for the removal of the TGDCa allowed for an excellent magnified surgical view revealing important structures of the local anatomy. It also created sufficient space for the cutting of the relevant portion of the hyoid bone. Handling of the robotic instruments through the incision was technically feasible and safe without any mutual collisions throughout the operation.

The patient’s postoperative parathyroid hormone (PTH) level was within normal range and functions of her both vocal cords were intact. The histopathologic results of the specimens revealed thyroglossal duct cyst with internal papillary carcinoma measuring 1.1 cm with infiltrative tumor margins and papillary microcarcinoma measuring 0.9 cm within the left thyroid lobe with extrathyroidal soft tissue extension. There was no evidence of tumor in the right lobe and the pyramidal lobe of the thyroid gland. As for the lymph nodes resected, 7 out of 9 paratracheal nodes and 2 out of 7 left level III, IV nodes revealed metastatic carcinomas. The patient was discharged on the 8th day after the operation with no complications. The patient was extremely satisfied with the cosmetic results. The patient has received high-dose radioiodine ablation (RAI) therapy and is currently doing well with no evidence of recurrence.

Discussion. Although there is still a great deal of controversy regarding the treatment of TGDCa, there is little debate that for the cases of synchronous TGDCa and PTC, total thyroidectomy in addition to the Sistrunk procedure must be performed. As for the patient in our case where left level IV lymph node metastasis was detected under preoperative ultrasonography (USG), if the usual method of surgical procedure was to be selected, double incisions or a single extended transverse incision must be adopted for the Sistrunk’s operation and total thyroidectomy with lateral neck dissection. The conventional method to remove neck masses was to do so by placing an incision on the overlying skin. This ‘open’ approach to viewing the lesion has an advantage of providing the operator with the best surgical view, but the recognizable surgical scar that results from the surgery can be displeasing for patients. Therefore the surgeon can try to make a small incision and camouflage the scar by placing the incision in natural skin creases, yet the cosmetic results can still be displeasing for the patient due to its visibility and permanence. This can be an even greater problem if the patient is young and an active member of his/her society and if the lesion is benign or low-grade malignancy which can be simply dissected and excised. Therefore it is the surgeon’s best interest to perform an operation successfully with a ‘least obvious’ or ‘hidden’ scar whenever possible. Accordingly, we have adopted a novel approach, the transaxillary and retroauricular approach, in view of our increasing surgical experience with various indications such as submandibular gland (SMG) resections and neck dissections in head and neck cancer or thyroid papillary carcinomas. Some investigators have demonstrated that robot-assisted neck dissections performed on patients with thyroid cancer and lateral neck node metastasis are feasible and safe. We conducted total thyroidecmy with bilateral CCND and level III and IV dissection using the same approach. Although the technical feasibility and safety of neck dissection or SMG resection via retroauricular approach has already been reported previously at our institute, Sistrunk’s operation via retroauricular approach will be challenging. In spite of that, we were able to demonstrate successfully Sistrunk’s operation including the hyoid bone resection through the retroauricular approach. There are however, certain areas of potential difficulties which must be considered with caution during the operation procedure. First, when removing the TGDCa through the retroauricular port, identification of the ipsilateral hyoid bone is primarily important and it is also crucial that dissection along the capsule must be done carefully so as not to rupture the tumor. It is essential that sufficient working space must be created for the comfortable movement of the robotic arms through the retroauricular port and in order to do so, sufficient skin flap elevation in both superior and inferior directions must be performed. It is necessary to elevate the superior skin flap up to the level of the inferior border of the mandible but during this process, the platysma muscle must be identified and meticulous dissection along the subplatysmal plane must be carried out so as not to damage the marginal mandibular branch of the facial nerve. Another area of potential pitfalls concerns the total thyroidectomy with neck dissection through the transaxillary port. Sufficient amount of working space must be secured in order to perform comfortably the contralateral thyroidectomy and neck dissection and in order to do so, skin flap elevation must be done at least 2 cm further based on the ipsilateral omohyoid muscle and the contralateral thyroid gland must be adequately exposed. Using the robotic surgical system in removing the thyroglossal duct cyst, the free movement of wristed instrumentation through the retroauricular incision allowed for efficient dissection and easy handling of the tissue. In this particular case we could not identify the tract beyond the hyoid and up to the foramen cecum, but we anticipate that there would be no technical problems of dissection and excision had it been so. To our knowledge, Sistrunk’s operation and total thyroidectomy with lateral neck dissection via TARA approach utilizing the robotic surgical system has never been attempted before. It has some advantages over the