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Lymph node metastasis in the suprasternal space from thyroid papillary cancer.

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Abstract

The suprasternal space is a narrow space between the superficial and deep layers of the investing layers of the deep cervical fascia above the manubrium of the sternum. The suprasternal space has been paid little attention as a space with the potential for lymph node metastasis from both thyroid cancer and head and neck cancer. We experienced 2 patients who were found to have a lymph node in the suprasternal space preoperatively. Both of them had well-differentiated thyroid papillary carcinomas and Level III and IV lymph node metastases as well as metastasis in the suprasternal space. We have not previously dissected the suprasternal space prophylactically in other patients with thyroid papillary cancer, but no patient has developed metastasis in this space to date. The suprasternal space is not usually dissected in patients with thyroid cancer. However, suprasternal space metastasis has been reported to occur occasionally in patients with lymph node metastases in Level III and IV. We consider that dissection of the suprasternal space, which is not routinely performed, should be done when preoperative examination suggests lymph node metastasis in the suprasternal space as dissection of this space is less invasive, easy to achieve, and is not time consuming. Greater attention should be paid to the suprasternal space as an area with the potential for lymph node metastasis from thyroid cancer.

Key words: thyroid cancer, papillary cancer, Lymph node metastasis, suprasternal space

Introduction

The suprasternal space, which is also known as the ‘Burns space’, is a narrow space between the superficial and deep layers of the investing layers of the deep cervical fascia above the manubrium of the sternum (Figure 1). According to *Gray’s Anatomy*, it contains a small amount of areolar tissue, the lower parts of the anterior jugular veins and the jugular venous arch, as well as the sternal heads of the sternocleidomastoid muscles and sometimes a lymph node [1].

Little attention has been paid to date to the suprasternal space as an area with the potential for lymph node metastasis from either thyroid cancer or head and neck cancer. Sun *et al.* first reported lymph node metastasis between sternocleidomastoid and sternohyoid muscles (LNSS) in clinically node-positive papillary thyroid carcinoma (Figure 2) [2]. They mentioned that the space is part of the suprasternal space. We read with great interest the paper by Sun *et al.* and herein report two cases of lymph node metastasis in the suprasternal space from thyroid papillary cancer, and discuss the importance of the suprasternal space in thyroid papillary cancer.

Case 1

A 54-year-old female patient visited Hokkaido University Hospital complaining of lumps in the left lower neck of 1.5 years duration. CT scans and ultrasound examination showed a small nodule in the left lobe of her thyroid, several lymph nodes, of which the largest is 2.1 cm in diameter, at level III and IV in her left neck, and a lymph node of 1 cm in diameter in the left suprasternal space (T1N1bM0 (UICC 7th) stage IVA, Figure 3). Fine needle aspiration cytology from the level

IV lymph node led us to suspect thyroid papillary cancer. She received left hemithyroidectomy and left neck dissection together with dissection of the suprasternal space. Pathological examination revealed papillary cancer in the thyroid without extrathyroidal invasion and multiple lymph node metastases in her left neck (Figure 4) and suprasternal space. Lymph node metastases were found at level III in her right neck 4 years after the surgery, but she has refused further surgery to date. The follow-up period is currently 11 years and she is alive and well with lymph node metastasis in the right neck.

Case 2

A 58-year-old male patient visited our department due to lymph nodes in his bilateral neck discovered by ultrasound examination during a medical checkup. He did not complain of any symptoms in his head and neck area. CT scans and ultrasound examination showed tumors in bilateral lobes of the thyroid, lymph nodes in bilateral neck and a lymph node of 0.7 cm in diameter with calcification in the left suprasternal space (T2N1bM0, stage IVA, Figure 5). The largest lymph node was 1.6cm in diameter. Fine needle aspiration cytology from the thyroid revealed papillary cancer. He undertook total thyroidectomy, bilateral central and lateral neck dissection together with dissection of the left suprasternal space. Pathology revealed papillary cancer in the bilateral thyroid with perithyroid soft tissue extension and multiple lymph node metastases in his bilateral neck (Figure 6) and suprasternal space. He underwent postoperative radioactive iodine remnant ablation. He is currently alive without disease after follow-up for 2 years.

Discussion

Sun *et al.* first defined the lymph node between the sternocleidomastoid and sternohyoid muscle (LNSS) as follows (Figure 2): the anterior boundary is the sternocleidomastoid muscle, posterior boundary the sternohyoid muscle, superior boundary the intersection of sternocleidomastoid and sternohyoid muscles, and inferior boundary the suprasternal fossa and clavicle. Its external and internal boundaries were defined as the lateral and internal borders of the sternohyoid muscle, respectively [2]. They mentioned that the space forms part of the suprasternal space. According to their definition, it is difficult to decide whether fibrofatty tissue anterior to the sternohyoid muscle, above the clavicle and the sternum and medial to sternocleidomastoid muscle belongs to LNSS or not. We consider that what is special about the concept of the LNSS is that it is very close to level VI but divided from it by a strap musculature involving the sternohyoid and sternothyroid muscles, and is not included in level VI. The surgical boundary of the medial border of levels III and IV is the lateral border of the sternohyoid muscle [3]. Therefore, the space anterior to the sternohyoid muscle above the clavicle and the sternum, which could not fall under the normal subdivisions of the central compartment and lateral neck areas, is also included in the concept of the LNSS. Therefore, the anterior boundary of the LNSS should be the anterior layers of the deep cervical fascia above the manubrium of the sternum or the sternocleidomastoid muscle. However, the space anterior to the sternohyoid muscle above the clavicle and the sternum is equivalent to the suprasternal space. Therefore, we propose this space be called the suprasternal space.

No literature has indicated direct lymphatics from the thyroid and other head and neck cancer to the suprasternal space. However, we supposed that LNSS (hereafter suprasternal space) metastasis is seen once in a while, especially in advanced cases. Sun *et al.* reported that, without exception, patients with suprasternal space metastasis also had lateral cervical lymph node metastasis [2]. Level III and IV metastases, in particular, were significantly correlated with suprasternal space metastasis. Level VI metastasis, on the other hand, was not correlated with suprasternal space metastasis. Sun *et al.* speculated that suprasternal space metastasis could be a result of the increasing tumor load after lateral cervical metastasis, or the communication between the superficial or deep anterior cervical chain and the deep lateral cervical chain. We also speculate that fibrofatty tissue including level III and IV metastatic lymph nodes move into the suprasternal space little by little due to the daily motion of the neck.

In the two cases reported here, lymph node metastasis in the suprasternal space was found by preoperative ultrasound examination and CT scans, and the metastatic node was removed simultaneously with thyroidectomy and neck dissection. However, there is some debate as to whether prophylactic dissection of the suprasternal space should be undertaken or not. We consider that almost all thyroid surgeons do not routinely dissect the suprasternal space. Similarly, we have not dissected the space in any patients apart from the two reported here, yet no patient in our experience has developed lymph node metastasis in the suprasternal space to date and we have not seen any reports of suprasternal space metastasis in cases of thyroid cancer. Sun *et al.* reported that the positive rate for the suprasternal space was 22.6% among 115 patients with clinically

node-positive thyroid papillary cancer who underwent neck dissection that included the suprasternal space [2]. If dissection is performed, pathological metastasis is suspected to be found in a considerable number of cases. We speculate that the situation is similar to that of central compartment neck dissection. While the frequency of central lymph node metastasis in thyroid carcinoma is high (60-80%), recurrence rates remain low at 0% to 15%, even in patients undergoing total or partial thyroidectomy. [4-6]. Therefore, we consider that dissection of the suprasternal space is not necessary as part of routine treatment, but it should be undertaken when preoperative examination suggests suprasternal space metastasis. However, dissection of the suprasternal space is less invasive and easy to achieve and is not time consuming, unlike central compartment dissection, which increases the risk of recurrent laryngeal nerve palsy and hypocalcemia. Therefore, in cases where suprasternal space metastasis is suspected, dissection of the suprasternal space should be performed without hesitation. And we should consider excising the nodal tissue in the suprasternal space in patients with level III and/or IV nodal metastases [2].

In conclusion, there has been no report of the suprasternal space in thyroid cancer to date, and thanks must be given to Sun *et al.*, because of whose paper we became aware of the existence of the suprasternal space in relation to thyroid cancer management. Greater attention should be paid to it as an area with the potential for lymph node metastasis from thyroid cancer.

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Author Disclosure Statement

No competing financial interests exist.

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Figure Legends.

Figure 1. The suprasternal space [7].

Figure 2. The suprasternal space and lymph node metastasis between sternocleidomastoid and sternohyoid muscles (LNSS).

Figure 3. A lymph node in the left suprasternal space (Case 1).

Figure 4. Number of pathological lymph node metastasis (Case 1).

Figure 5. A lymph node in the left suprasternal space (Case 2).

Figure 6. Number of pathological lymph node metastasis (Case 2).

Figure 1

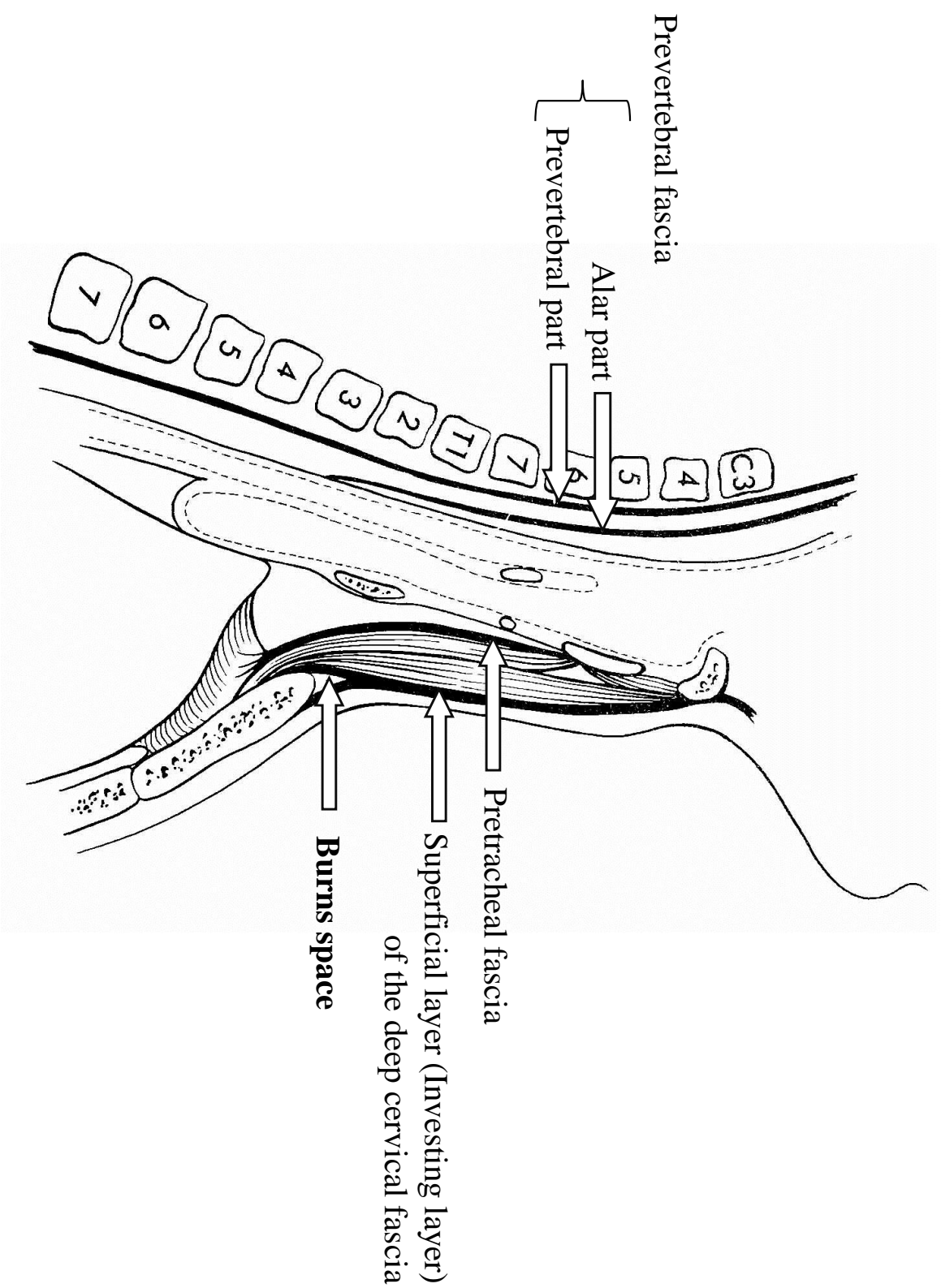


Figure 2

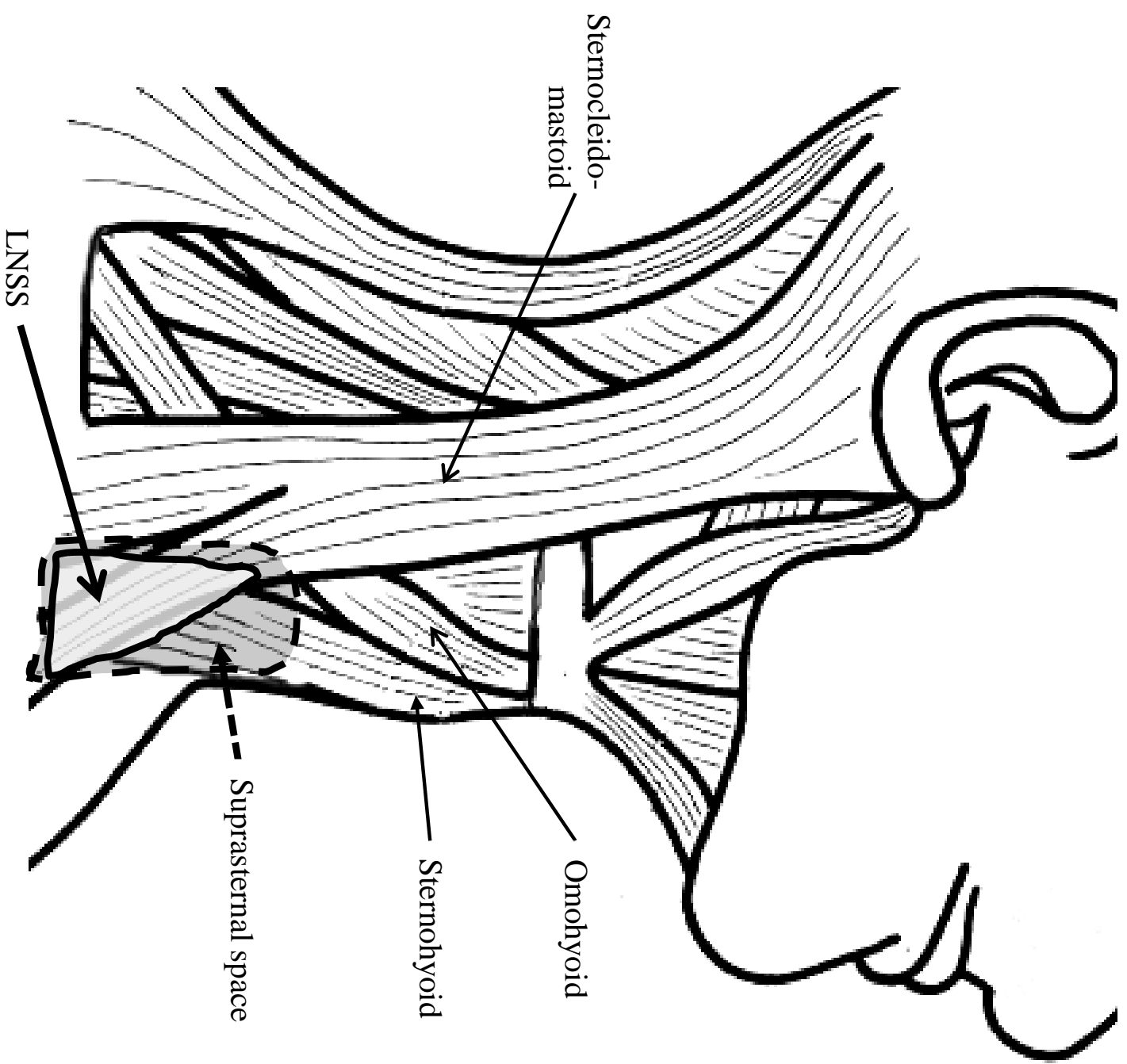
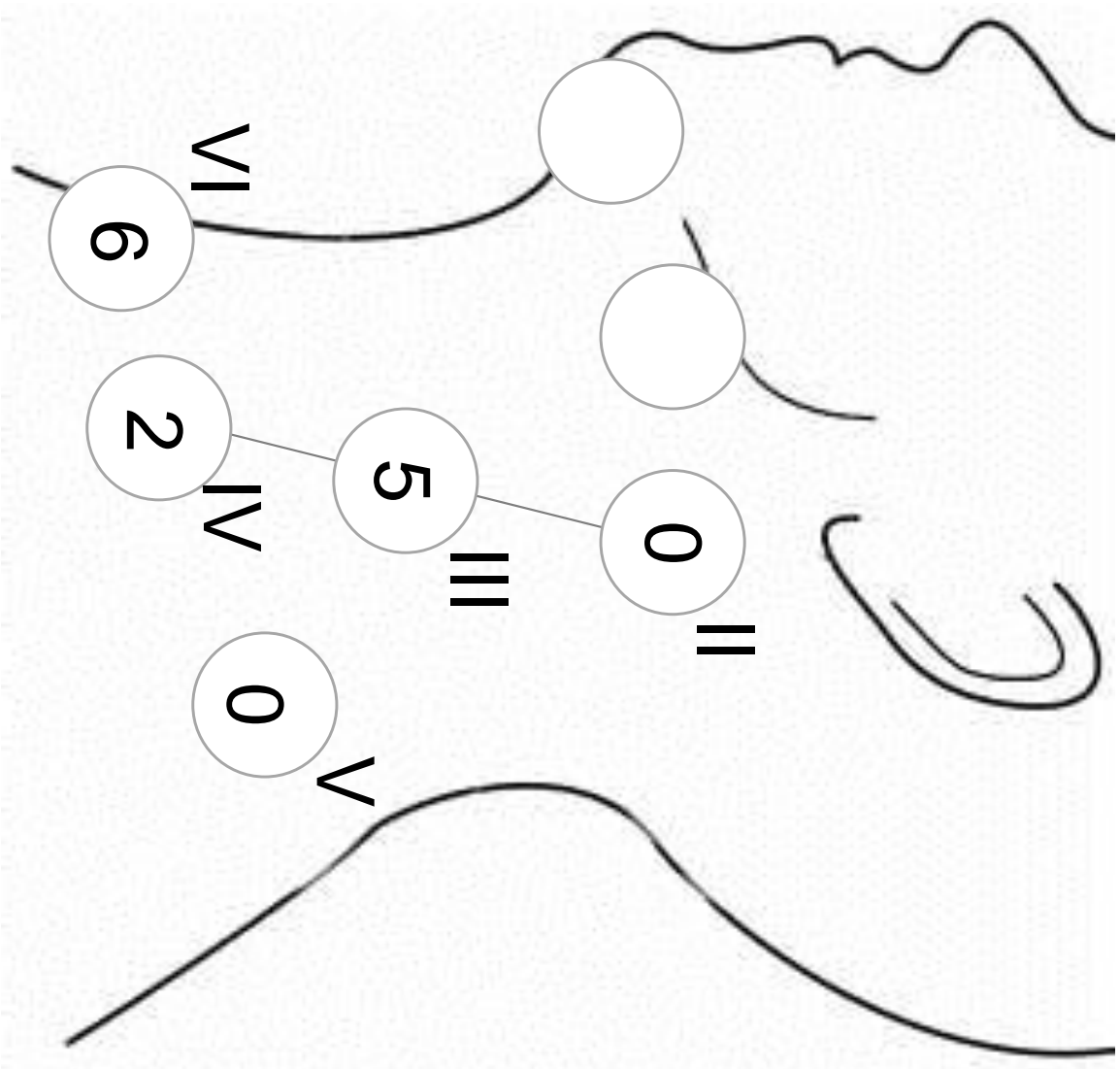


Figure 3



Figure 4



Left

Figure 5

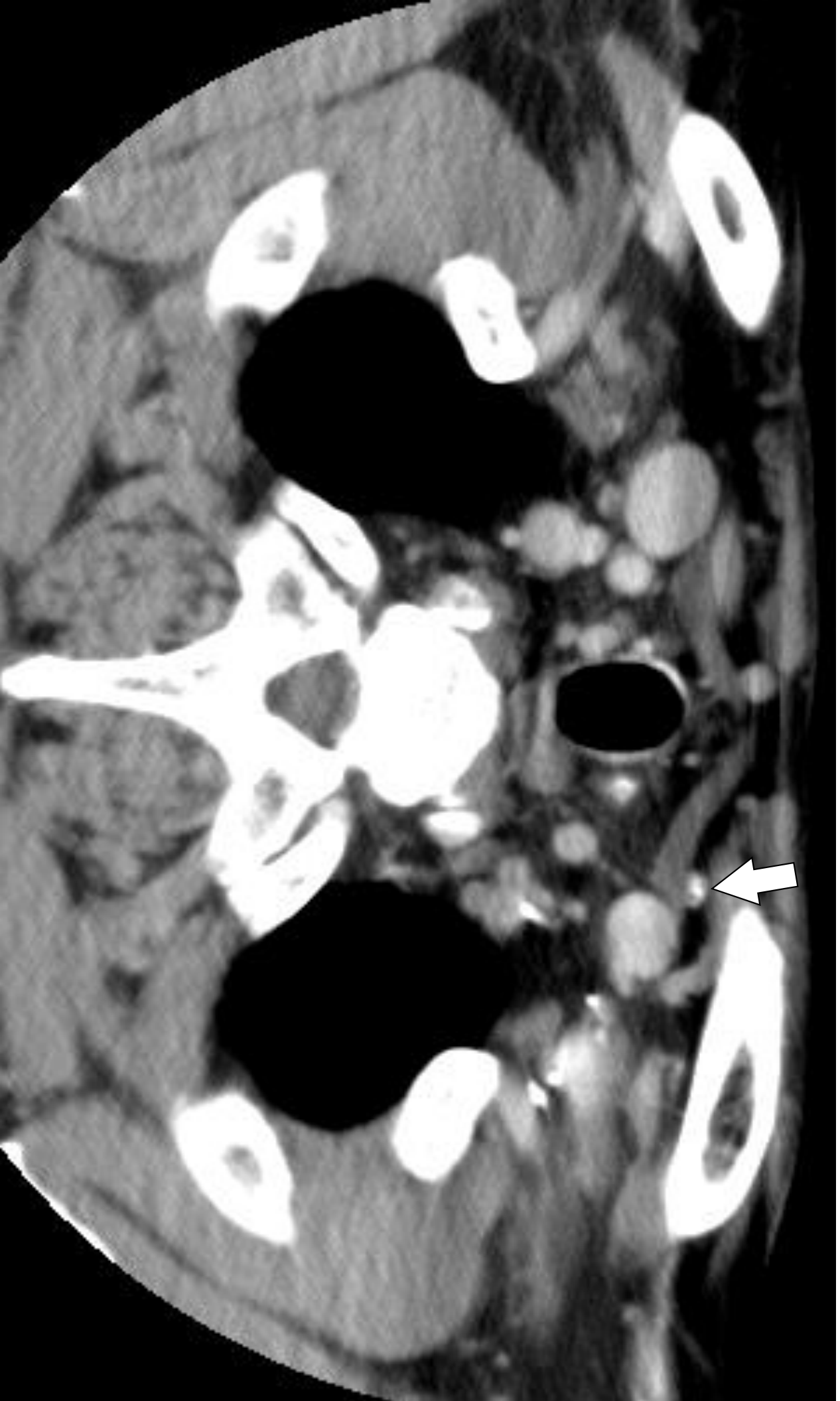


Figure 6

