

Follicular thyroid cancer with sternal metastasis - challenges and outcomes

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SUMMARY

Sternal metastasis from differentiated thyroid carcinoma (DTC) is rare and presents a conundrum for surgeons. We present a lady diagnosed with follicular thyroid carcinoma and sternal metastasis who underwent thyroidectomy, sternectomy and sternoplasty with titanium mesh and acrylic plate. She developed a surgical site infection, of which multiple conservative approaches were attempted. She eventually required removal of the implant. Closure of sternal defect was completed with bilateral pectoralis major advancement flaps. This article highlights a series of complications faced during the course of treatment and how they were managed in a tertiary healthcare centre.

KEY WORDS:

Wound healing, reconstruction, sternal metastases, surgical site infection, infected implant, surgical emphysema

INTRODUCTION

Differentiated thyroid carcinoma (DTC) consists of two subtypes, papillary and follicular carcinoma.¹ Follicular carcinoma is known for haematogenous spread to distant organs especially bones.² As it is treatable, surgical excision is highly regarded.³ This article discusses the issues pertaining to a curative treatment of sternal metastasis with insight into thorough planning, problem anticipation, and effective communication within a multidisciplinary team (MDT).

CASE REPORT

A 62-year-old lady treated for multinodular goitre (MNG) for more than ten years presented with slowly enlarging sternal mass over two months. She was euthyroid on inspection. There was obvious thyroid swelling measuring 10 x 8 cm, right larger than left, firm and mobile. There was a prominent mass on the upper sternum of 4 x 5 cm, hard and fixed. Thyroid function test was normal. Indirect laryngoscope showed normal vocal cords.

Fine needle aspiration and cytology (FNAC) of the enlarged right thyroid lobe revealed follicular lesion. FNAC of sternal mass showed lipomatous lesion. Computed tomography scan (CT) of neck and thorax showed a right thyroid malignant

looking lesion with background MNG and regional lymphadenopathy; and a metastatic lesion to the upper sternum.

She underwent a total thyroidectomy with central and right lateral neck dissection performed by an endocrine surgeon; and en-bloc resection of the sternal mass and sternoplasty with titanium mesh and acrylic plate by a cardiothoracic surgeon. The operation was done in a single setting with curative intent.

Histopathology examination (HPE) revealed follicular carcinoma with lymph nodes involvement and malignant cells infiltrating the manubrium sterni. She was started on levothyroxine.

Two months later, her sternal wound developed pus discharge and examination revealed wound dehiscence measuring 2x2 centimetres with exposed acrylic plate. Cultures grew *Staphylococcus Aureus* sensitive to Cloxacillin. CT thorax showed a large anterior chest wall collection. She received intravenous antibiotics and underwent wound debridement, removal of titanium mesh and refashioning of the acrylic plate.

Unfortunately, two months after the wound debridement, she developed seroma collection beneath the wound, warranting needle aspiration twice under ultrasound guidance by the interventional radiologist. Fluid culture was negative and cytology revealed no malignancy. Eventually, decision was made to remove the acrylic plate, six months after the first surgery.

Following that, she received two cycles of Radio-Active Iodine (RAI) therapy. Baseline whole body scan (WBS) after the surgery showed multiple bone metastases to skull, pelvis, femur and vertebrae. She responded well after the second RAI with repeated WBS showed no more uptake.

However, as her serum thyroglobulin (TG) was on the rise, a PET-CECT scan was ordered which showed hypermetabolic activity of right lung lesion, suspicious of metastasis. Owing to the difficulty in accessing the lesion, it was considered unresectable. She was started on trial drug "Lenvatinib", a

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Fig. 1: Chronic sinus discharge from wound post debridement, removal of titanium mesh and Radio-Active Iodine.

tyrosine kinase receptor inhibitor by the oncologist however, the medication was stopped due to intolerance.

Nearly one year after the first surgery, she developed a sinus discharge from the sternal wound (Figure 1), which developed into a chronic wound. The wound was managed conservatively with advanced wound care, including gauze, paraffin tulle, hydrogel, hydrofibre and silver dressings. Serial imaging CT of the thorax was performed during this period ruling out underlying osteomyelitis.

Eventually, the cardiothoracic and plastic surgeons excised the sinus tract and covered the sternal defect with bilateral pectoralis major advancement flaps, two years after the first surgery. HPE of the sinus tract showed no malignancy.

The last operation was complicated with subcutaneous emphysema over the chest and neck. She required a right chest tube and the incision site over her right chest was explored (where release of pectoralis major to its humeral attachment was done). CT scan showed no airway communication. Secondary suturing of the opened wound was performed after two weeks.

Two months after surgery, the wound healed well with a persistent small emphysematous collection over her chest (Figure 2), which resolved with conservative management. Her wound remained dry and she continued treatment with the radio-oncologist.



Fig. 2: Emphysematous collection over her chest (see arrow) post sinus tract excision and defect coverage with bilateral pectoralis major flap.

DISCUSSION

Follicular carcinoma is the second most common thyroid cancer (10-20% of thyroid cancer) after papillary cancer. More common in women aged over 40, it usually presents as slowly enlarging thyroid nodule. Histologically it is distinguished from follicular adenoma only by presence of capsular and vascular invasion. It often spreads haematogenously to lung, bone, brain and liver.² Lymph node metastasis is uncommon.

Early stage carries good prognosis (99% 5-year survival for stage I and II). Stage IV disease as in this patient, carries 47% 5-year survival.¹ This is better compared to most other cancers, given the slow progression of DTC.

The mainstay of treatment is either near-total or total thyroidectomy, with or without neck dissection followed by TSH suppression with levothyroxine.¹ Higher stage usually requires RAI, occasionally with high dose up to 200 mCi, to eliminate remaining local thyroid tissue and distant metastasis.² External beam radiation for metastasis is not common as there are conflicting reports.¹

Excision of solitary metastatic lesion for curative intent is recommended.³ However, in multiple lesions, resection is aimed at palliation; alleviating pain and to improving quality of life. Besides, bone metastasis is insensitive to RAI, and excision improves RAI uptake in other metastatic sites.³ To add strength and rigidity, plates made from methymethacrylate (acrylic) or titanium are commonly used; alone or combined. Unfortunately, in our patient, this was complicated with surgical site infection.

Previously, sternotomy wound breakdown was treated with serial debridement and healed by secondary intention. In 1976, muscle flaps were introduced and became the preferred choice for closure of sternotomy defect.⁴ A pectoralis major (PM) flap provides well-vascularised tissue to cover the wound defect as well as good volume to fill deep cavity. Omental flap on the other hand requires abdominal incision which may lead to intraabdominal infection and ventral herniation.⁵

Subcutaneous emphysema is uncommon after PM flaps. It was likely related to extensive undermining of tissue during wound debridement. Indirect thermal or mechanical injury to the airway could be a contributory factor, but no direct injury was observed. It could lead to pneumothorax if not detected early which may compromise blood flow on the pedicle, thus compromising flap viability. It manifested after the patient was extubated, possibly due to increased intrathoracic pressure triggered by coughing or Valsalva manoeuvre. Fortunately for this patient early intervention prevented further complications.

CONCLUSION

Thyroid carcinoma with metastasis in particular to the sternum can be extremely challenging to manage as demonstrated in this case. A multidisciplinary team approach is paramount, including radio-oncologist, radiologist, and several surgical subspecialties such as breast and endocrine, cardiothoracic as well as plastic surgery. Surgeons should be wary of complications especially SSI as it may delay recuperation, increase morbidity and impair prognosis.

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