

## CASE REPORT

# Single stage substernal thyroidectomy and off-pump coronary artery bypass grafting: is it worth using cardiopulmonary bypass unless absolutely necessary?

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## SUMMARY

It is a rare entity to observe the coexistence of thyroid gland pathologies and coronary artery disease, whose surgical treatment may be performed simultaneously. In this case, we present a case of a patient with substernal thyroidectomy concurrent with off-pump coronary artery bypass grafting. A 57-year-old female patient was admitted to the hospital with exertional dyspnoea, intermittent coughing and stable angina pectoris. The substernal goitre measuring 5×5×4 cm was accompanied by a 95% in-stent restenosis at the left anterior descending artery. Thyroidectomy and off-pump coronary artery bypass grafting procedures were performed simultaneously. The postoperative period was uneventful and the patient was discharged 5 days after the operation. This case indicates that off-pump revascularisation seems to be a better option in cases where surgical interventions for thyroid and coronary artery diseases are necessary instead of on-pump revascularisation where the adverse effects of the cardiopulmonary bypass are considered.

## BACKGROUND

Substernal goitre (SG) is defined as a thyroid gland which has a diameter exceeding more than 50% towards the thoracic inlet, where the persistent upper airway compression may increase the stress to the cardiovascular system.<sup>1</sup> Even though cardiac surgery with concomitant thyroidectomy is considered to be a safe procedure, these operations are rarely reported in the literature.<sup>2–3</sup> Similarly, off-pump coronary artery bypass grafting (OPCAB) with simultaneous thyroidectomy has been reported only in two cases within the PubMed repository.<sup>4–5</sup> Both in on-pump and off-pump coronary artery revascularisation techniques, there is no consensus about the sequence of two surgical interventions: which procedure (coronary artery revascularisation or thyroidectomy) should be performed first? In this report, we present a patient with coronary artery disease (CAD) and a large SG which was compressing the trachea. We successfully performed simultaneous thyroidectomy and OPCAB in this patient.

## CASE PRESENTATION

A 57-year-old female patient (body mass index 37 kg/m<sup>2</sup>) was admitted to the hospital with exertional dyspnoea, intermittent cough and stable

angina pectoris (New York Heart Association class II). In her medical history, coronary artery stent implantation was performed in the left descending coronary artery (LAD) 6 years ago and she also had insulin-dependent type 2 diabetes mellitus. She had hypertension for 8 years and bronchial asthma for 2 years. Her physical examination revealed effort-related wheezing and diffused thyroid gland enlargement. Routine chest X-ray revealed a widened upper mediastinum (figure 1). The computed tomography scan of the chest revealed a giant retrosternal goitre at a size of 5×5×4 cm which was displacing the trachea laterally (figure 2). Thyroid hormones (free T3, free T4, thyroid-stimulating hormone) were within normal limits. Echocardiography revealed an ejection fraction of 35–40% with decreased anterior wall motion. Coronary angiography revealed 95% in-stent restenosis in the LAD (figure 3). Therefore, combined coronary artery bypass grafting (CABG) and thyroidectomy were planned.

The patient was operated under general anaesthesia. Intubation with a 7.5 mm endotracheal tube was performed uneventfully. Iodine-free solution (ie, chlorhexidine) was used for swabbing the surgical field in order not to cause iodine absorption and possible exacerbation of thyroid hormones. The general surgeon performed a curvilinear collar incision in the neck in order to gain access to the upper portion of the thyroid gland. The cardiovascular surgery team performed a midline sternotomy which allowed access to the lower part of the gland. A subtotal thyroidectomy was performed with careful dissection of the recurrent laryngeal nerve (figure 4). The location of SG was far away from the left internal thoracic artery (LITA). The neck incision was packed with sponges. LITA was

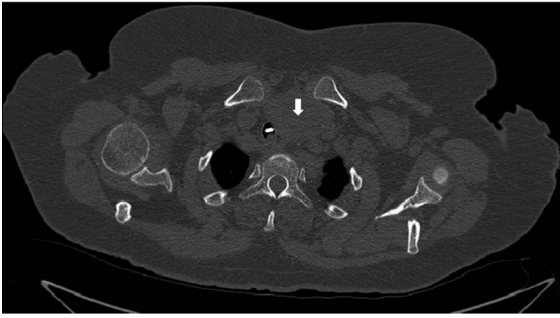


Figure 1 Widened mediastinum in chest X-ray.



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**Figure 2** Substernal goitre (arrow) displacing the trachea laterally (asterisk) in CT scan.

harvested with its pedicle. Following the limited pericardiotomy over LAD, intravenous heparin was administered and an activated clotting time of 300 s was achieved. One stay suture was placed at the posterior part of the pericardium with a 1/0 silk suture. Two stay sutures (6/0 polypropylene) with pledgets on the upper side of the LAD was placed to stabilise the proximal and distal parts of the anastomosis region. Haemodynamic stability was maintained with fluid administration and Trendelenburg position. The heart rate was 60 bpm during the OPCAB procedure with the aid of intravenous propranolol administration. LITA-LAD anastomosis was performed with a 7/0 polypropylene suture. During the whole procedure, which lasted for 3 h, the patient's temperature was maintained with a fluid warmer and a warming blanket. Total blood loss during the procedure was 600 mL. After completion of OPCAB, the neck was examined for hemostasis and a Jackson-Pratt drain was placed at the thyroid bed.

The patient was extubated uneventfully at the second postoperative hour and was discharged on the fifth postoperative day. No wheezing, hoarseness or difficulty in swallowing was encountered. The patient recovered completely at the follow-up 6 months after the operation.

#### OUTCOME AND FOLLOW-UP

The patient was completely free of symptoms 6 months after surgery.

#### DISCUSSION

Simultaneous surgery for cardiac and thyroid diseases has been encouraged recently.<sup>2 3</sup> A coordinated preoperative assessment should be performed in such patients by the endocrinologists and the surgeons before the operation. There is still no



**Figure 3** Angiographic demonstration of in-stent (95%) restenosis in the left anterior descending artery.

consensus on the sequence of procedures (thyroidectomy or CABG) and usage of cardiopulmonary bypass (CPB; off-pump or on-pump). Wexler *et al*<sup>2</sup> performed thyroidectomy first, followed by on-pump CABG in a patient with diabetes, obesity, asthma and low ejection fraction (29%) in whom adverse effects of CPB may alter the operative and postoperative courses such as extubation time, intensive care unit stay and total period of hospitalisation. Mehra *et al*<sup>5</sup> performed OPCAB first in the acute setting of myocardial infarction in a 70-year-old patient with left main coronary artery stenosis and an SG leading to tracheal compression. Actually, the traditional sequence in patients with combined CAD and goitre is to perform the CABG first if the thyroid hormone levels are within normal limits. This strategy carries the risk of perioperative thyroid storm and mechanical compression of the major airways by the enlarged thyroid gland which is related to the adverse effects of the CPB.

In this patient, we preferred OPCAB rather than the on-pump approach considering the age, impaired ejection fraction and associated medical conditions (obesity, diabetes mellitus and bronchial asthma). The advantages of avoiding CPB in these patients include lower anticoagulation dosage and period of heparin administration which leads to decreased risk of operative bleeding at the thyroidectomy bed. Second, adverse effects of CPB such as inflammation, activation of complement, tissue oedema and decrease in thyroid hormone function are prohibited. In our opinion, tracheal compression due to SG in a patient with obesity, diabetes and asthma obligates OPCAB whenever possible concerning the early postoperative extubation. We extubated our patient in a very short period of time when compared to patients with on-pump CABG.<sup>2</sup> The local oedema caused by the endotracheal intubation tube and the external compression of the enlarged thyroid gland to the trachea are also important factors related to the major respiratory problems in the early postoperative period of these patients. The administration of systemic steroids and early weaning from mechanical ventilation support and extubation of the patients is an effective measure to deal with the complications related to trachea. Although the thyroid gland is resected and the effect of compression is eliminated after the surgery, these patients can easily suffer from bronchospasm in the postoperative period, in which prophylactic medication for bronchodilation is mandatory in order to effectively manage such situations.

In our opinion, simultaneous thyroidectomy and CABG can be performed safely. Thyroidectomy before heparin administration decreases the substantial bleeding risk from the thyroid bed and coronary artery revascularisation is performed afterwards.



**Figure 4** Thyroid gland after surgical resection.

Whenever possible, we prefer to perform OPCAB rather than on-pump CABG because of the shorter time to extubation, improved neurological outcome, decreased postoperative arrhythmia and shorter intensive care unit and hospital stay, which decrease the cost. We can perform OPCAB for LAD, circumflex and right coronary arteries safely with appropriate positioning of the heart with stay sutures, without using a mech-

anical stabilisation. Patients with obesity, asthma and diabetes with moderate-to-low ejection fraction are the candidates for simultaneous thyroidectomy and OPCAB.

**Competing interests** None.

**Patient consent** Obtained.

**Provenance and peer review** Not commissioned; externally peer reviewed.

### Learning points

- ▶ Substernal goitre resection and coronary artery bypass grafting can be performed simultaneously.
- ▶ Thyroid gland and hormone levels are affected less in off-pump cardiac surgery.
- ▶ Off-pump coronary artery bypass grafting has important advantages over cardiopulmonary bypass usage in such cases where a coexisting pathology is surgically treated.

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