

# Postoperative hematomas after thyroid surgery.

## Incidence and risk factors in our experience



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Pietro Giorgio Calò, Giuseppe Pisano, Gabriele Piga, Fabio Medas, Alberto Tatti, Marcello Donati\*, Angelo Nicolosi

Dipartimento di Chirurgia e Scienze Odontostomatologiche, Università degli Studi di Cagliari, Italy

\*Dipartimento di Scienze Chirurgiche, Trapianti d'Organo e Tecnologie Avanzate. U.O. Chirurgia Generale e Week Hospital. A.O.U. Policlinico "Vittorio Emanuele", Università di Catania, Italy

### Postoperative hematomas after thyroid surgery. Incidence and risk factors in our experience

**AIM:** *The aim of our study was to evaluate the incidence and timing of postoperative bleeding and to identify the potential aetiological factors of cervical hematomas complicating thyroid surgery.*

**MATERIAL:** *Between September 2002 and December 2009, 2559 patients were operated on in Department of Surgery, University Hospital of Cagliari. 2257 total thyroidectomies, 191 total thyroidectomies associated to lymphadenectomy, 83 total thyroidectomies associated to parathyroidectomy, 24 thyroid lobectomies and 4 lobectomies associated to parathyroidectomy were performed.*

**RESULTS:** *35 Patients (1.36%) developed a postoperative hematoma, 32 of whom (1.25%) needed a surgical revision. Male sex seemed to have a greater risk: 13 men (2.79% of all males) vs. 19 women (0.90% of all female cases) had to undergo haemostasis revision ( $p=0.00204$ ). 16 of 32 patients (50%) who underwent surgical revision had hypertension; incidence of hematoma was 2.09% in patients with hypertension and 0.89% in patients without it ( $p=0.02112$ )*

**DISCUSSION:** *It is generally difficult to predict which patients are at risk for the development of a hematoma after thyroid surgery. The most intense postoperative monitoring is necessary during the first six hours but hematomas occurring after are not rare.*

**CONCLUSIONS:** *Postoperative hematoma remains a rare but potentially life-threatening complication. Early recognition with immediate intervention is the key to the management of this complication. Because of the possibly long interval between the initial operation and the hematoma development, ambulatory and one-day thyroid surgery is not advisable.*

**KEY WORDS:** Complications; Hematoma; Thyroidectomy.

### Introduction

Postoperative hematoma is a rare but potentially life-threatening and unpredictable complication of thyroid surgery; it has a variably reported incidence in the lit-

erature of between 0.1% and 4.7%<sup>1-3</sup>. The definition of a high-risk population remains obscure<sup>2,4,5</sup>. Postoperative hematoma may have a multifactorial aetiology including slipping of ligatures, reopening of previously cauterised veins, retching and bucking during recovering, increased blood pressure or bleeding from residual thyroid parenchyma<sup>3,6</sup>.

The patient may present with respiratory distress, pain or pressure sensation in the neck or dysphagia. Signs include progressive neck swelling, suture line bleeding, dyspnoea and/or stridor and possibly, significant drain tube losses if a drain has been left in situ<sup>3-7</sup>.

Immediate haemorrhage evidence while the patient is still

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Per corrispondenza: Prof. Pietro Giorgio Calò, Università degli Studi di Cagliari, Dipartimento di Chirurgia e Scienze Odontostomatologiche, Policlinico Universitario di Monserrato, S.s. 554 Bivio Sestu, 09042 Monserrato, Cagliari (e-mail:pgcalo@unica.it)

in the operating or recovery room is well recognised. Whilst some series report the majority of haemorrhagic symptoms to occur early in the postoperative period, that is, within 6 hours of the intervention<sup>3-9</sup>, significant delays in symptoms have also been noted by others<sup>1,2</sup>. Postoperative hematomas and subsequent re-exploration increase morbidity and lengthen hospital stay compared with uncomplicated thyroid procedures<sup>2,7,10</sup>.

The aim of our study was to evaluate the incidence and timing of postoperative bleeding and to identify the potential aetiological factors of cervical hematomas complicating thyroid surgery.

## Material and method

Between September 2002 and December 2009, 2559 patients were operated on in Department of Surgery, University Hospital of Cagliari; 465 were males and 2094 were females. Age ranged from 13 to 82 years and the mean age was 56 years.

Indications for surgery included large and/or symptomatic benign goiters, Graves' disease, thyroid cancer (FNAC-suspicious or malignant lesions), in few cases associated with hyperparathyroidism.

We performed 2257 total thyroidectomies (88.19%), 191 total thyroidectomies associated to lymphadenectomy (7.46%), 83 total thyroidectomies associated to parathyroidectomy (3.24%), 24 thyroid lobectomies (0.93%) and 4 lobectomies associated to parathyroidectomy (0.15%).

Pathologic diagnosis was multinodular goiter in 809 cases (31.61%), diffuse toxic goiter in 144 (5.63%), toxic multinodular goiters in 115 (4.49%), Hashimoto's disease in 230 (8.99%), follicular adenoma in 444 (17.35%), Hürthle-cell adenoma in 18 (0.70%), papillary carcinoma in 553 (21.61%), papillary microcarcinoma in 146 (5.71%), follicular carcinoma in 71 (2.77%), Hürthle-cell carcinoma in 6 (0.23%), medullary carcinoma in 19 (0.74%) and anaplastic carcinoma in 4 (0.16%).

All patients with Graves' disease preoperative diagnosis were treated with Lugol's iodine solution for 10-12 days before operation. Suction drains were used in all patients. Fast and huge drains filling as well as cervical swelling (asymptomatic or associated with dyspnoea and pain) and blood leakage through cervicotomy led to a prompt diagnosis of bleeding.

## Results

35 Patients (1.36%) developed a postoperative hematoma, 32 of whom (1.25%) needed a surgical revision. This occurred mainly in the early postoperative hours: 8 patients (25% of the re-operated ones) showed bleeding signs at awakening time, still on the operating

bed; 11 (34.37%) happened to bleed in the first 6 hours, 9 (28.12%) between the 6<sup>th</sup> and the 12<sup>th</sup> hour, 3 (9.37%) between the 12<sup>th</sup> and the 24<sup>th</sup> hour and 1 (3.12%) between the 24<sup>th</sup> and the 48<sup>th</sup> hour (Table I).

Male sex seemed to have a greater risk: 13 men (2.79% of all males) vs. 19 women (0.90% of all female cases) had to undergo haemostasis revision ( $p=0.00204$ ) (Table II). 16 of 32 patients (50%) who underwent surgical revision had hypertension. Incidence of hematoma was 2.09% in patients with hypertension and 0.89% in patients without it ( $p=0.02112$ ) (Table III).

We had intraoperative findings of diffuse haemorrhage without evidence of a major vessel bleeding in 19 cases (59.37%); the sources we found were: a superior pole vessel (4 cases: 12.5%), a retroneural vessel (3 cases: 9.37%), a branch of the middle thyroid vein (2 cases: 6.25%), the drain entrance site (2 cases: 6.25%), the anterior jugular vein (1 case: 3.12%) and a subcutaneous vessel (1 case: 3.12%) (Table IV).

Regarding pathologic diagnosis, we observed a slight increased risk in Graves' disease (4 cases, 2.77% of Graves' disease cases, 1.54% of all cases of hyperthyroidism) and Hashimoto's thyroiditis (6 cases, 2.6% of thyroiditis affected patients), especially if compared with carcinoma cases (7 cases, 0.88% of all carcinomas), multinodular goiter (8 cases, 0.99%) and adenomas (3 cases, 0.6%) ( $p=0.1562$ ) (Table V). Incidence was 0.95% in substernal goiter (2 cases) and 2 % for recurrent goiter (2 cases).

TABLE I - *Timing of bleeding*

Timing	Number	Percentage
Awakening time	8	25%
≤ 6 hours	11	34.37%
6-12 hours	9	28.12%
12-24 hours	3	9.37%
24-48 hours	1	3.12%

TABLE II - *Hematomas in relation to gender*

Gender	Number	Percentage	P value
Male	13/465	2.79%	P=0.00204
Female	19/2094	0.90%	

TABLE III - *Hematomas in relation to the presence of hypertension*

Presence of hypertension	Number	Percentage	P value
Yes	16/765	2.09%	P=0.02112
No	16/1794	0.89%	

TABLE IV - Site of bleeding

Site of bleeding	Number	Percentage
No evidence of a major vessel bleeding	19	59.37%
Superior pole vessel	4	12.5%
Retroneural vessel	3	9.37%
Branch of the middle thyroid vein	2	6.25%
Drain entrance site	2	6.25%
Anterior jugular vein	1	3.12%
Subcutaneous vessel	1	3.12%

TABLE V - Hematomas in relation to pathology

Pathology	Number	Percentage	P value
Hyperthyroidism	4/259	1.54%	P=0.1562
Thyroiditis	6/230	2.61%	
Multinodular goiter	8/809	0.99%	
Carcinoma	7/799	0.88%	
Adenoma	3/462	0.65%	

None of the patients treated for hematoma needed a tracheotomy. There were no deaths and none of the cases required any blood transfusion.

## Discussion and commentary

It is generally difficult to predict which patients are at risk for the development of a hematoma after thyroid surgery<sup>2,5</sup>. Some authors report a statistically significant higher prevalence of hyperthyroidism in patients requiring re-intervention for hematoma<sup>4,5,7,11</sup>; contrarily in other studies the difference failed to reach statistical significance<sup>4,12</sup>. Several studies have proved the efficacy of Lugol's iodine in decreasing thyroid parenchymal blood flow in these conditions<sup>4</sup>. In our experience Graves' disease shows an increased risk of bleeding but this was not statistically significant. Intrathoracic goiters have also been postulated to have a greater propensity for postoperative bleeding<sup>4,7,13</sup>; similarly, re-operative surgery has been considered a higher risk group<sup>2,4</sup>. We found a slight increased risk in recurrent goiters but this difference was not statistically significant.

It has also been associated with the administration of anticoagulants or coagulation alterations, i.e. haemophilia, von Willebrand's disease and chronic renal failure<sup>4,7</sup>. Male gender was also associated with a higher risk of bleeding<sup>10</sup>. Our experience confirms higher risk for male gender compared to female. The reason for this difference is not clear: maybe male muscles are stronger and their contractions at awakening can provoke slipping of ligatures or reopening of previously cauterised veins causing hematomas; besides male sex is more frequently associated to hypertension.

Some author suggests that in most of the cases the bleeding was probably due to post-surgical hypertension. For this reason a very close monitoring of pressure during the first 24 hours after surgery and prompt treatment of all manifestations of hypertension with appropriate drugs are recommended<sup>14</sup>. We found an increased risk of hematoma in patients with hypertension; therefore a great attention must be paid in the postoperative period of patients with hypertension, especially if an anti-hypertensive therapy has been stopped preoperatively on request of the anaesthetist. A smooth extubation without significant coughing or retching and controlling both postoperative vomiting and pain to avoid raised venous and/or arterial pressures are important considerations in minimising the risk for postoperative haemorrhage<sup>4,6-7</sup>. Most delayed bleedings are of venous origin and because of the negative pressure on the large vessels of the neck, they occur on waking or at the first cough. To prevent this problem, it is well to verify haemostasis carefully at the end of the operation and this can be done while the anaesthetist simulates a Valsalva's manoeuvre, raising the intrapulmonary pressure to 40 cm H<sub>2</sub>O<sup>15</sup>.

Drains have long been used empirically in thyroid surgery but their use to prevent postoperative hematoma is not evidence based. Some authors suggest increased morbidity and longer hospitalization related to their placement<sup>4,8,10,16,17</sup>. Moreover, haemorrhage can appear and the container may be empty because the blood has clotted inside the drain<sup>3,8</sup>. In the opinion of some authors the use of drains may increase the rate of surgical wound infection, the postoperative pain and the analgesic requirement, increasing the costs and deteriorating the cosmetic results<sup>10,16</sup>. The insertion of drains is, in itself, associated with a number of specific complications; these include not only a separate surgical scar but also increased discomfort at the drain site<sup>16-17</sup>. Then, drains should not be used as a preventive measure<sup>2-3,6,8</sup>; however, if used, they may signal evidence of bleeding and be particularly useful in the setting of inexperienced nursing staff unfamiliar with other symptoms and signs related to the development of postoperative hematoma<sup>4</sup>. We found two bleedings from the drain entrance site; however, in our experience, drains did not lengthen hospital stay nor increase incidence of infection or use of drugs. For this reasons we prefer to go on using suction drains.

Meticulous haemostatic technique is necessary to prevent this complication; Ligasure, Harmonic Scalpel and haemostatic agents can help the surgeon at present<sup>4</sup>. We prefer incomplete closure of the strap muscles or non-re-approximation inferiorly so that a space remains to allow decompression of the deep space of the neck in case of bleeding. The lack of cervical bandaging and incomplete suturing of the midline at the inferior level of the prethyroid musculature are elements that can aid in identifying the presence of bleeding more promptly<sup>3,6,7-8</sup>.

In the event of significant airway compromise developing rapidly, bedside evacuation of the haematoma may be necessary<sup>4</sup>.

The most intense postoperative monitoring is necessary during the first six hours<sup>12</sup> but hematomas occurring after are not rare. Surgeons should be aware that neck hematoma may develop greater than 24 hours following thyroidectomy, especially in patients who are being anticoagulated<sup>5</sup>. We observed 19 hematomas in the first 6 hours (59.37%), 12 (37.49%) between the 6<sup>th</sup> and the 24<sup>th</sup> hour and only 1 (3.12%) after the 24<sup>th</sup> hour. In the last years an increased demand for ambulatory and 1-day surgery thyroidectomy has emerged<sup>5,9,18</sup>. However, since late bleedings are not rare and can be life-threatening, we believe that 1-day surgery is not safe for thyroid surgery.

A bleeding source was not identified in the majority of patients<sup>2,3,7</sup>. In our experience the source of bleeding was found in only 13 cases (40.61%). At the time of surgical re-intervention surgeons have to evacuate the hematoma and irrigate the wound; attention should be paid to parathyroids vulnerable to injury or removal during the process of irrigation, suction and clot evacuation; the recurrent laryngeal nerve should be demonstrated prior to clipping or ligation of any structures; blind clamping of vessels is to be avoided and the use of water can assist in identifications of bleeding points<sup>3-4</sup>.

Persistent laryngeal oedema post evacuation may necessitate prolonged intubation and treatment with systemic steroids<sup>4</sup>. No patient needed prolonged intubation in our experience, maybe for prompt diagnosis of bleeding.

A conservative approach may be considered in selected patients with minimal swelling and no progression. However, it generally takes a long time for the hematoma to reabsorb<sup>3-4</sup>. In our experience 3 patients were treated conservatively without complications. Anyway, we think that conservative treatment must be deserved to very selected and particular cases.

## Conclusions

Postoperative hematoma remains a rare but potentially life-threatening complication.

It is generally difficult to predict which patients are at risk for the development of a hematoma. In our experience male gender and hypertension were associated with a higher risk.

Early recognition with immediate intervention is the key to the management of this complication. If treated promptly, serious consequences can be avoided. Re-exploration increased morbidity and lengthened hospital stay. Because of the possibly long interval between the initial operation and the hematoma development, ambulatory and one-day thyroid surgery is not advisable.

## Riassunto

L'ematoma postoperatorio è una complicanza rara, ma potenzialmente mortale, della chirurgia tiroidea. L'obiettivo del nostro studio è stato quello di valutare l'incidenza ed i tempi di insorgenza del sanguinamento postoperatorio e identificare i potenziali fattori eziopatogenetici degli ematomi cervicali dopo chirurgia tiroidea.

Tra il settembre 2002 ed il dicembre 2009, 2559 pazienti sono stati operati presso il nostro Dipartimento di Chirurgia. Sono state effettuate 2257 tiroidectomie totali (88.19%), 191 associate a linfadenectomia (7.46%), 83 associate a paratiroidectomia (3.24%), 24 lobectomie (0.93%) e 4 lobectomie associate a paratiroidectomia (0.15%). La diagnosi istopatologica è stata di gozzo multinodulare in 809 casi (31.61%), gozzo tossico diffuso in 144 (5.63%), gozzo multinodulare tossico in 115 (4.49%), tiroidite di Hashimoto in 230 (8.99%), adenoma follicolare in 444 (17.35%), adenoma a cellule di Hürthle in 18 (0.70%), carcinoma papillare in 553 (21.61%), microcarcinoma in 146 (5.71%), carcinoma follicolare in 71 (2.77%), carcinoma a cellule di Hürthle in 6 (0.23%), carcinoma midollare in 19 (0.74%) e carcinoma anaplastico in 4 (0.16%).

35 pazienti (1.36%) hanno sviluppato un ematoma postoperatorio, 32 dei quali (1.25%) sono stati sottoposti a revisione della emostasi. In 8 pazienti (25%) i segni di sanguinamento si sono manifestati al risveglio, in 11 (34.37%) nelle prime 6 ore, in 9 (28.12%) tra le sesta e la dodicesima ora, in 3 (9.37%) tra la dodicesima e la ventiquattresima ed in 1 (3.12%) tra le ventiquattresima e la quarantottesima ora. 13 uomini (2.79%) e 19 donne (0.90%) sono stati sottoposti a revisione della emostasi ( $p=0.00204$ ). L'incidenza di ematoma è stata del 2.09% nei pazienti con ipertensione e dello 0.89% in quelli senza ( $p=0.02112$ ). In 19 casi il reperto è stato di emorragia diffusa senza evidenza di sanguinamento da un vaso maggiore (59.37%). Abbiamo osservato un lieve aumento di incidenza non statisticamente significativo nel morbo di Basedow (4 casi, 2.77%), nella tiroidite di Hashimoto (6 casi, 2.6%) e nel gozzo recidivo (2 casi, 2%). Nessun paziente ha avuto bisogno di una tracheotomia né di trasfusioni di sangue.

E' difficile prevedere quali pazienti siano a rischio di sviluppare un ematoma dopo chirurgia tiroidea.

L'ipertiroidismo, il gozzo immerso, il gozzo recidivo, la terapia anticoagulante, la terapia antipertensiva ed il sesso maschile sono indicati come possibili fattori di rischio. L'uso dei drenaggi non costituisce una misura preventiva, ma può aiutare nella gestione della complicanza. Il monitoraggio postoperatorio più attento deve essere effettuato nelle prime 6 ore, ma i sanguinamenti tardivi non sono rari.

In conclusione, l'ematoma postoperatorio rimane una complicanza rara, ma potenzialmente mortale; è difficile individuare delle categorie di rischio; nella nostra esperienza il sesso maschile e l'ipertensione hanno compor-

tato un aumento di incidenza. Data la possibilità di un intervallo di tempo lungo per lo sviluppo dell'ematoma, non riteniamo consigliabile la chirurgia ambulatoriale e la one-day surgery in chirurgia tiroidea.

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