

# Comparison of Postoperative Drain Insertion versus No Drain Insertion in Thyroidectomies

## Retrospective case-control study from the Sultan Qaboos University Hospital, Muscat, Oman

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### مقارنة وضع أنبوب النزح وعدم وضعه بعد عمليات استئصال الغدة الدرقية دراسة استرجاعية بين الحالات والشواهد في مستشفى جامعة السلطان قابوس، مسقط، عمان

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**ABSTRACT: Objectives:** A thyroidectomy is a frequently performed surgical procedure which can result in life-threatening complications. The insertion of a drain after a thyroidectomy has been suggested to prevent such complications. This study aimed to evaluate the use of surgical drains following thyroidectomies in relation to postoperative complications and mass sizes. **Methods:** This retrospective case-control study included all thyroidectomies conducted at the Sultan Qaboos University Hospital, Muscat, Oman, from January 2011 to December 2013. Length of hospital stay, readmission, postoperative complications and mass size were evaluated. **Results:** During the study period, 250 surgeries were carried out on 241 patients. The majority of patients were female (87.2%). Drains were inserted postoperatively after 202 surgeries (80.8%) compared to 48 surgeries (19.2%) without drains. A total of 32 surgeries (12.8%) were conducted on patients with thyroid masses <1 cm, 138 (55.2%) on those with masses between 1-4 cm and 80 (32.0%) on those with masses >4 cm. The association between drain use and mass size was not significant ( $P = 0.439$ ). Although postoperative complications were more prevalent in patients with drains, the relationship between these factors was not significant ( $P > 0.050$ ). Length of hospital stay was significantly longer among patients with postoperative drains ( $P < 0.010$ ). **Conclusion:** The routine insertion of drains after thyroid surgeries was found to result in longer hospital stays and did not reduce rates of post-thyroidectomy complications. Thyroid mass size should not be used as an indicator for the insertion of a drain after thyroidectomy.

**Keywords:** Thyroidectomy; Drainage; Length of Stay; Postoperative Complications; Oman.

**المخلص: الهدف:** تعتبر عمليات استئصال الغدة الدرقية من العمليات الشائعة ولكنها قد تؤدي لحدوث مضاعفات تشكل خطراً على الحياة. ويعتبر وضع أنبوب النزح بعد عمليات استئصال الغدة الدرقية أسلوباً مقترحاً لمنع حدوث هذه المضاعفات. وتهدف هذه الدراسة إلى تقييم وضع أنبوب النزح الجراحي بعد عمليات استئصال الغدة الدرقية وعلاقته بمضاعفات العملية وحجم الورم. **الطريقة:** تشمل هذه الدراسة الاسترجاعية بين الحالات والشواهد، جميع عمليات استئصال الغدة الدرقية في مستشفى جامعة السلطان قابوس، مسقط، عمان، منذ يناير 2011 إلى ديسمبر 2013. ويشمل التقييم كذلك مدة الإقامة في المستشفى، وإعادة الترقيد، ومضاعفات العملية وحجم الورم. **النتائج:** خلال فترة الدراسة، تم إجراء 250 عملية جراحية على 241 مريضاً. معظم المرضى كانوا إناثاً (87.2%). تم وضع أنابيب النزح بعد 202 عملية جراحية (80.8%) مقارنة بـ 48 عملية جراحية لم يتم وضع أنبوب النزح فيها (19.2%). مجموع العمليات الجراحية التي أجريت لمرضى حجم الورم لديهم <1 سم هو 32 عملية (12.8%)، و 138 (55.2%) عملية جراحية على مرضى حجم الورم لديهم بين 1-4 سم، و 80 عملية جراحية (32.0%) على مرضى حجم الورم لديهم >4 سم. العلاقة بين استعمال أنبوب النزح وحجم الورم لم تكن معنوية إحصائياً ( $P = 0.439$ ). على الرغم من أن المضاعفات كانت أعلى لدى المرضى الذين تم وضع أنبوب النزح لهم، إلا أن العلاقات بين هذه العوامل لم تكن معنوية إحصائياً ( $P > 0.050$ ). فترة الإقامة في المستشفى كانت أعلى لدى المرضى الذين وضع أنبوب النزح لهم بعد العملية الجراحية ( $P < 0.010$ ). **الخلاصة:** أدى الاستعمال الروتيني لأنبوب النزح بعد عمليات استئصال الغدة الدرقية إلى إطالة فترة الإقامة في المستشفى ولم يؤدي إلى خفض معدلات المضاعفات بعد عمليات استئصال الغدة الدرقية. ينبغي عدم اعتبار حجم الورم في الغدة الدرقية مؤشراً لوضع أنبوب النزح بعد عمليات استئصال الغدة الدرقية.

**الكلمات المفتاحية:** استئصال الغدة الدرقية؛ نزح؛ مدة الإقامة؛ مضاعفات تالية للجراحة؛ عمان.

#### ADVANCES IN KNOWLEDGE

- In the current study, the association between drain insertion and mass size was not significant.
- Drain insertion was not found to prevent post-thyroidectomy complications and was associated with significantly longer hospital stays.

#### APPLICATION TO PATIENT CARE

- The findings of the current study indicate that preoperative thyroid mass size should not be used as an indicator for postoperative drain insertion following a thyroidectomy.

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**T**HYROIDECTOMIES ARE CONSIDERED ONE OF the most commonly performed procedures in endocrine surgery.<sup>1,2</sup> In recent years, the number of thyroidectomies has increased due to a rise in the incidence of thyroid malignancies, which now account for 1.7% of the total number of malignancies worldwide.<sup>3,4</sup> Despite improvements in surgical techniques, many patients who undergo a thyroidectomy develop postoperative complications, including haemorrhage (0.3–6.5%), haematoma formation (1–1.2%), recurrent laryngeal nerve injuries (0.5–4.4%) and hypocalcaemia (3.1–11%).<sup>1–3,5–10</sup> Many surgeons insert a drain post-thyroidectomy in order to prevent haematomas, alert surgeons to early postoperative bleeding or in cases of large dead spaces where the chance of seroma formation is high.<sup>6,11–13</sup> However, the findings of multiple studies and randomised clinical trials have indicated against the routine use of drains.<sup>8,14,15</sup>

Even though the insertion of a postoperative drain has proven significantly beneficial for patients suffering from bleeding disorders, research has shown that postoperative drain placement can have a negative impact on patients and lead to scarring, pain, increased susceptibility to infection and prolonged hospital stay.<sup>1,3,8,14,15</sup> In addition, the placement of a post-thyroidectomy drain may be a causative factor for haematoma formation, which can turn into a life-threatening complication as a result of airway obstruction.<sup>14</sup> Although many studies have been conducted to assess the necessity of postoperative drainage, no official guidelines or recommendations have yet been proposed; the personal preference of the surgeon therefore remains the main deciding factor regarding drain placement.<sup>5,11,16,17</sup>

In Oman, thyroid cancer was ranked in 2011 as the fifth most common cancer in the country, accounting for 11.3% of all cancers with an incidence of approximately 67 per 100,000 females and 10 per 100,000 males; hence, thyroidectomies are commonly performed in Oman.<sup>18</sup> However, there is currently no national consensus regarding the insertion of drains after a thyroidectomy. The current study aimed to evaluate the use of surgical drains following a thyroidectomy in relation to postoperative complications and tumour mass size at the Sultan Qaboos University Hospital (SQUH), Muscat, Oman. To the best of the authors' knowledge, this study is the first of its kind in Oman.

## Methods

This retrospective case-control study was conducted from January 2011 to December 2013 and included

all thyroidectomies performed at SQUH during the study period. Surgeries on patients  $\leq 12$  years old as well as cases of modified radical neck dissection were excluded from the study. Clinical and descriptive data were collected from both paper and electronic records, including length of hospital stay, readmission, mass size and the occurrence of any post-thyroidectomy complications, including haemorrhage, haematoma and/or seroma formation, hypocalcaemia, recurrent laryngeal nerve injuries and wound infection. The type of surgery—either a total thyroidectomy (TT), hemi-thyroidectomy (HT) or complete thyroidectomy (CT)—was also noted. Re-admission was defined as admission within one month of discharge. The size of the thyroid mass was calculated from the most recent ultrasound scan before the surgery. One patient was excluded from the study due to an inability to accurately assess the thyroid mass size.

Patients whom had had a drain inserted were considered cases and patients without a drain were considered controls. Data were analysed using the Statistical Package for Social Sciences (SPSS), Version 23 (IBM Corp., Chicago, Illinois, USA). A Chi-squared test was used to evaluate the significance of the associations between variables. Continuous variables were displayed as means and standard deviations. A *P* value of  $\leq 0.050$  was considered significant.

This study obtained ethical approval from the Medical Research & Ethics Committee of the College of Medicine & Health Sciences at Sultan Qaboos University (MREC #946).

## Results

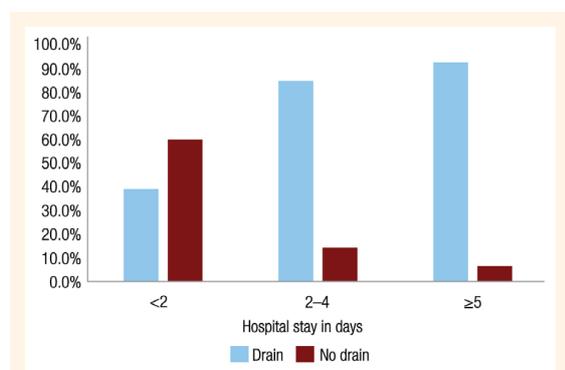
A total of 250 thyroidectomies were performed on 241 patients over the three-year period. The majority of patients were female (87.2%). The mean age was  $40.8 \pm 13.8$  years (range: 14–83 years old). The majority of the surgeries were TTs (75.6%), while 16.8% and 7.6% of the surgeries were HTs and CTs, respectively. The majority of patients were euthyroid prior to surgery (84%); of these, 74.7% underwent TTs, 18.6% underwent HTs and 6.7% underwent CTs. Most patients with hyperthyroidism or hypothyroidism prior to surgery underwent a TT (85.1% and 69.2%, respectively). Drains were placed in 83.5% of patients undergoing a TT, 69.0% of those undergoing a HT and 79.0% of those receiving a CT. A total of 202 patients (80.8%) had single or multiple drains inserted after the surgery, while 48 patients (19.2%) had no drain inserted. The drains were kept in place for between 0–9 days, with a mean duration of  $2.3 \pm 1.3$  days.

**Table 1:** Use of postoperative drains in relation to presurgical thyroid mass size among thyroidectomies performed at the Sultan Qaboos University Hospital, Muscat, Oman (N = 250)

| Mass size in cm | n (%)                |                         | P value |
|-----------------|----------------------|-------------------------|---------|
|                 | Patients with drains | Patients without drains |         |
| <1              | 28 (87.5)            | 4 (12.5)                | 0.439   |
| 1–4             | 108 (78.3)           | 30 (21.7)               |         |
| >4              | 66 (82.5)            | 14 (17.5)               |         |

In terms of mass size, 32 surgeries (12.8%) were performed on patients with a thyroid mass <1 cm, while 138 (55.2%) were performed on those with a mass between 1–4 cm and 80 (32.0%) were performed on patients with a mass >4 cm. There was no significant association between the use of a drain and thyroid mass size ( $P = 0.439$ ) [Table 1]. Length of hospital stay ranged between 1–10 days, with a mean duration of  $2.5 \pm 1.4$  days. The majority of patients who stayed in hospital for 2–4 days after the surgery (85.2%) had drains, while the majority of patients who stayed less than two days (60.4%) did not have drains. Moreover, of the 14 patients who stayed for  $\geq 5$  days, 13 patients (92.9%) had drains while only one patient (7.1%) had no drain [Figure 1]. The average length of hospital stay for patients with drains was  $2.7 \pm 1.4$  days in comparison to  $1.8 \pm 1.3$  days for those without drains ( $P < 0.010$ ).

There was no statistically significant difference in the rate of postoperative complications between those with drains and those without [Table 2]. Overall, 5.6% of patients developed postoperative bleeding, with a higher incidence among those with drains versus those without (5.2% versus 0.4%). Of the 20 patients (8.0%) who developed respiratory distress, 18 (90.0%) had drains. Postoperative haematoma formation was noted in three patients (1.2%) and seroma formation



**Figure 1:** Length of hospital stay among patients with and without postoperative drains following thyroidectomies performed at the Sultan Qaboos University Hospital, Muscat, Oman (N = 250).

**Table 2:** Postoperative complications among patients with and without postoperative drains following thyroidectomies performed at the Sultan Qaboos University Hospital, Muscat, Oman (N = 250)

| Complication         | n (%)    |                      |                         | P value |
|----------------------|----------|----------------------|-------------------------|---------|
|                      | Total    | Patients with drains | Patients without drains |         |
| Haemorrhage          | 14 (5.6) | 13 (5.2)             | 1 (0.4)                 | 0.238   |
| Respiratory distress | 20 (8.0) | 18 (7.2)             | 2 (0.8)                 | 0.276   |
| Haematoma            | 3 (1.2)  | 3 (1.2)              | 0 (0.0)                 | 0.396   |
| Seroma               | 1 (0.4)  | 1 (0.4)              | 0 (0.0)                 | 0.625   |
| Readmission          | 13 (5.2) | 10 (4.0)             | 3 (1.2)                 | 0.715   |
| Wound infection      | 9 (3.6)  | 8 (3.2)              | 1 (0.4)                 | 0.530   |

in one patient (0.4%), all of whom had drains. Wound infection was noted in nine patients (3.6%), of which eight (88.8%) had drains. A total of 13 patients were readmitted (5.2%); readmissions occurred mostly among patients with drains ( $n = 10$ ; 76.9%). Only one patient died postoperatively (0.4%); this patient had a drain and died from sepsis with an anaplastic thyroid carcinoma.

## Discussion

The use of post-thyroidectomy drains remains a controversial subject and an area of active discussion and research. Many surgeons still use drains after thyroid and parathyroid surgeries, despite the large body of evidence suggesting that they may be associated with negative outcomes.<sup>19</sup> Although the prophylactic use of postoperative drains to decrease the incidence of postoperative haematomas may seem logical, most studies and clinical trials have failed to demonstrate any advantage to this procedure.<sup>11,12</sup> Drains often become blocked by clotted blood.<sup>19</sup> Suslu *et al.* studied 135 thyroid surgery patients, two of whom developed severe postoperative respiratory symptoms requiring a second operation; they found that although the amount of blood was not significant, one patient developed the respiratory symptoms after their drain became blocked by a clot.<sup>20</sup> Thus, the use of a neck drain did not prevent life-threatening haemorrhage and the decision to re-operate was made only after the development of dyspnoea and not according to the amount of blood in the drain. Similarly, Hurtado-López *et al.* found that the presence or absence of drains did not affect the incidence of seromas or haematomas in an analysis of 150 patients.<sup>13</sup>

The current study was conducted to assess the efficacy of drains in terms of the incidence of postoperative complications and the relationship between mass size and drain insertion in a hospital setting in Oman. While there was no statistically significant difference in the rate of postoperative complications between patients with drains and those without, inserting a postoperative drain did not reduce the incidence of respiratory distress and haematoma or seroma formation. Similarly, Ozlem *et al.* reported that drainage of the thyroidectomy bed did not effectively decrease the rate of post-thyroid surgery complications in 1,066 patients.<sup>12</sup>

In the current study, preoperative thyroid mass size was not significantly related to the use of postoperative drains; many surgeries on patients with large thyroid masses did not result in drain insertion, while other surgeries on patients with small thyroid nodules did. Mass size was therefore not considered a factor influencing drain insertion. Dunlap *et al.* compared the use of drains in 100 patients undergoing lobectomies and total thyroidectomies and reported that type of surgery and mass size could not be used as indicators for drain insertion or predictors of postoperative bleeding.<sup>11</sup> Hurtado-López *et al.* also presented evidence that gland size, diagnosis, type of surgery and intraoperative bleeding were invalid arguments for the use of an external drain.<sup>13</sup>

Hospital stays were significantly longer among patients with drains in comparison to those without drains in the current study. The wound infection rate was also found to be higher in patients with drains; however, this was not statistically significant. Nevertheless, this finding is in agreement with previous studies.<sup>12,20</sup> A recent meta-analysis showed that the use of drains after routine thyroid surgery was not beneficial to patients; drain insertion was associated with a higher risk of wound infection, a higher pain score on the first postoperative day and longer hospital stays.<sup>19</sup> Furthermore, Hurtado-López *et al.* found that hospital stay was significantly shorter for patients without drains compared to those with drains, leading to a reduction in costs and minimising the risk of intrahospital infections.<sup>13</sup> One of the factors contributing to longer hospital stays is the higher incidence of complications and wound infection in patients with drains compared to patients without drains.<sup>12,19,20</sup> In the current study, the mean amount of time a postoperative drain was kept *in situ* was approximately 55 hours; however, most haematomas usually occur 2–6 hours after surgery.<sup>11,21</sup> These findings call into question the need for prolonged *in situ* drains as these devices further increase the risk of infection and prolonged hospital stays.

It is important to emphasise that the prevention of haematomas and seromas can be achieved through other means, such as the identification of risk factors and utilisation of proper intraoperative techniques. Harding *et al.* identified multiple risk factors for the development of haematomas, broadly categorised into patient-related, thyroid pathology-related and surgery-related factors.<sup>22</sup> Patient-related factors include a history of bleeding disorders, the use of anticoagulant medications and smoking. Moreover, there is no clear evidence that high vascularity in toxic multinodular glands and Grave's disease are associated with a higher risk of postoperative bleeding.<sup>22</sup> The most effective way to prevent complications associated with haematoma and seroma formation is to use adequate surgical techniques, handle tissues carefully and ensure adequate haemostasis intraoperatively.<sup>13,22</sup>

The current study has a number of limitations. Due to the retrospective nature of this study, it was difficult to accurately assess thyroid mass sizes in some patients, which resulted in the exclusion of one patient from the study. Another limitation was the small sample size, as only surgeries conducted at a single hospital over a three-year period were included. In addition, the type of haemostasis device used in the surgeries was sometimes difficult to determine due to the lack of a unified format for intraoperative notes. Finally, due to the lack of clear hospital practice guidelines, there was a difference in the sample size between the two groups. Further randomised control trials are needed to establish definitive recommendations and practice guidelines in this area. However, this study was the first of its kind to be carried out in Oman; these findings may therefore act as a reference for future research.

## Conclusion

In the current study, post-thyroidectomy drain insertion was not significantly associated with thyroid mass size and did not reduce the rate of postoperative complications, including haematoma or seroma formation. Moreover, the insertion of a drain resulted in significantly longer hospital stays. Further research is required to inform recommendations and practice guidelines regarding the insertion of postoperative drains following a thyroidectomy.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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