Thyroidectomy: Natural drainage or negative drainage?

Experience with randomized single-center study

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AIM: *The aim is to investigate, in relation to the volume of blood drained, which type drainage to use after thyroidectomy natural drainage or negative drainage.*
MATERIAL OF STUDY: *141 patients who underwent total thyroidectomy for multinodular thyroid disease between 22 November 2012 and 7 November 2013 were included in the present study. For the 141 patients a randomized method was used with closed circuit natural drainage (59 cases) or negative drainage (82 cases). The evaluation of the drained volume was performed 24, 48 and 72 hours following surgery.*
RESULTS: *The amount of blood drained during the first 24 hours of the postoperative period averaged 78.59 ml in patients with a negative drain and 54.24 ml in those under natural drainage. After 48 hours, the total volume in the first group was 117.98 ml, while in the second group it was 85.18 ml. In cases where the observation was prolonged up to 72 hours, the average volume was 217 ml in the 10 cases of negative drainage and 117.5 ml in the 4 cases of natural drainage.*
CONCLUSION: *The difference in blood volume observed between the two groups of patients with natural drainage and negative drainage, leads us to conclude that the best drainage in thyroidectomy is the natural one, diverging from the older concept of the use of negative dreinage in superficial cavities.*

KEY WORDS: Drainage, Total Thyroidectomy

Introduction

Complete thyroidectomy usually involves the use of a negative drainage in order to reduce the risk of hematoma formation and/or seromas. This type of drainage due to the negative pressure that it produces, causes a suction within the emptied thyroid area, and should ensure the evacuation of any collection of blood. There is a lively debate as to the use of drains [1-17]. An open question is whether to use the negative drain or natural free fall (which uses only the force of gravity). The present study focuses on the comparison of the two methods of drainage, based on the amount of volume drained, to discover which one to is best to use: negative drainage or natural drainage, verifying the influence on both the quantity of time of necessary postoperative hospital stay and any related complications.

Materials and Methods

The study was conducted on 141 patients who underwent total thyroidectomy for multinodular thyroid dis-

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ease at the Endocrine surgical unit of the G. Rodolico Hospital of Catania, between 22 November 2012 and 7 November 2013. Patients having toxic goiters, goiters with cervico-mediastinal development and carcinomas with latero-cervical metastasis were excluded. The operations were performed by the same surgeon. The average age of the patients included in the study was 53 years (range 12-81). The ratio of males to females was 1: 6.25. The patients were randomly assigned, (sealed envelope method), to the two groups. Thyroidectomy was performed using Harmonic scalpels. The surgeon was informed as to the method of drainage just before closing the incision. The drainage tube in both groups was made to exit laterally at the extremity of the cervicotomy. The volume of fluid drained was in each case checked using the ml indication present on the drainage bag. For all of the 141 patients in 59 cases (41.85%), the closed circuit natural drain was used while in 82 cases (58.15%) the negative one was used (Fig. 1). For both groups the same closed circuit drainage kit (AbdovacTM FG 14 with trocar) was used. In the group of patients with negative drain the reservoir was placed with average initial pressure of -25 mmHg / 3.3 kPa, while in the natural drain the reservoir was left open. The evaluation of the volume drained was performed at 24 and 48 hours after surgery in 127 cases (90.1%); while in 10 cases (7.1%) of the 82 with negative drainage and 4 (2.8%) of the 59 cases in the natural drainage case the observation was prolonged up to 72 hours due to the persistence of blood in the drained fluid (Figs. 2, 3). In addition, all patients were observed during hospitalization in the department, to check for the presence of any respiratory distress, change in voice, collection of fluid within the wound, any tingling sensation and tetany. The removed tissue was subjected to histopathological examination for the final diagnosis. The two groups were compared using the Student's t test in order to assess significance.

Research was carried out according to the institution's ethical guidelines and all patients gave informed consent to take part in the study.

The study was approved by Department of "Scienze Chirurgiche, Trapianti d'Organo e Tecnologie Avanzate" University of Catania.

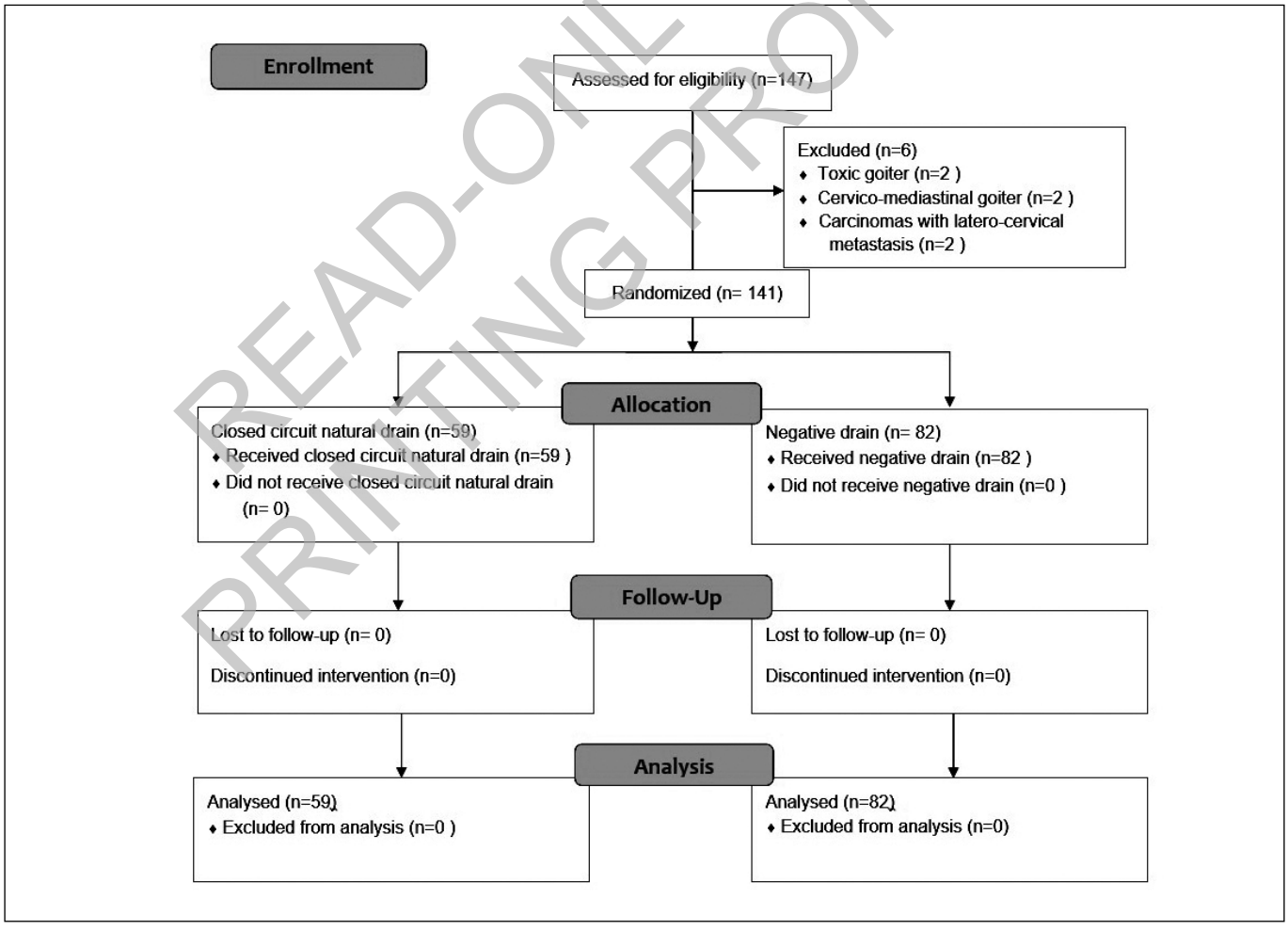

Fig. 1: Flow Diagram.

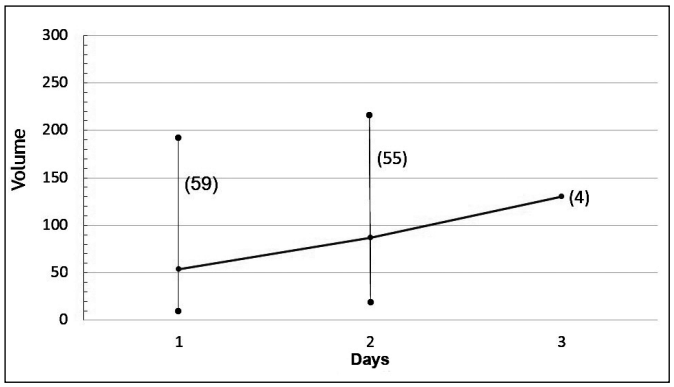

Fig. 2: Natural Drainage Trend.

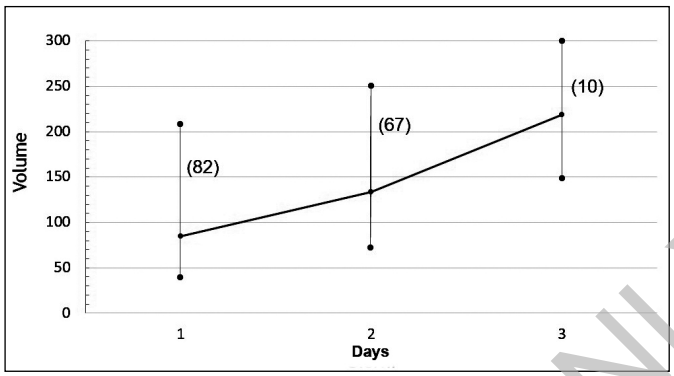

Fig. 3: Negative Drainage Trend.

Results

The amount of blood drained during the first postoperative 24 hours was on average 78.59 ml in patients with negative drainage and 54,24 ml in those with natural drainage (Figs. 4, 5). After 48 hours, the total volume in the first group was 117.98 ml, while in the second was 85.18 ml (Figs. 6, 7). In cases where the obser-

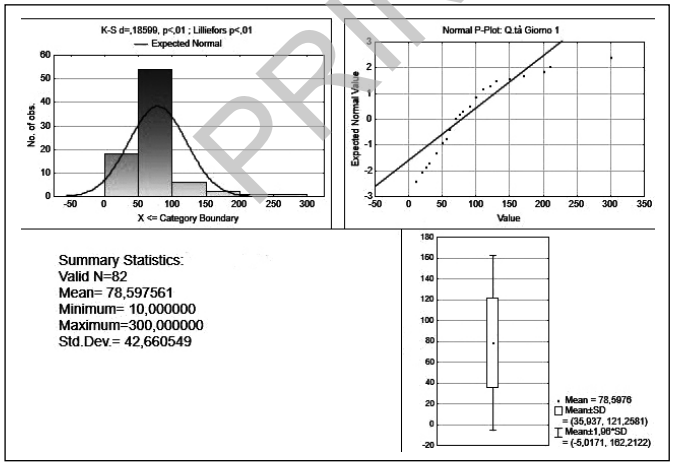

Fig. 4: Day 1 Drainage quantity under negative drainage.

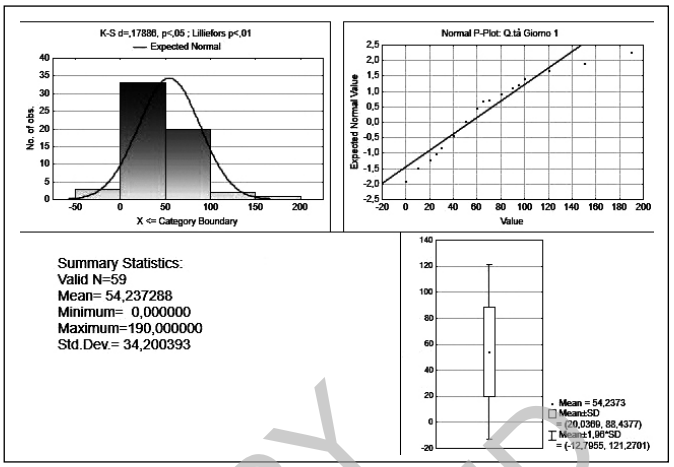

Fig. 5: Day 1 Drainage quantity under natural drainage.

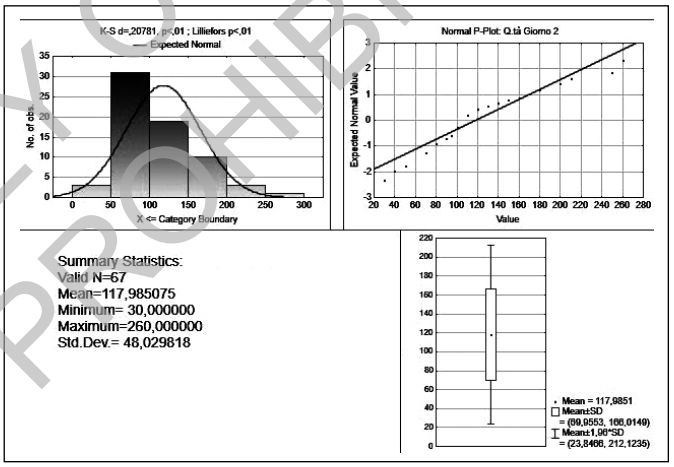

Fig. 6: Day 2 Drainage quantity under negative drainage.

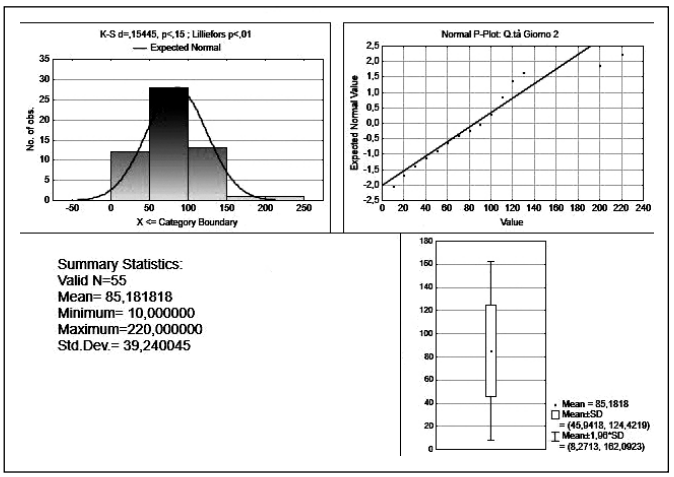

Fig. 7: Day 2 Drainage quantity under natural drainage.

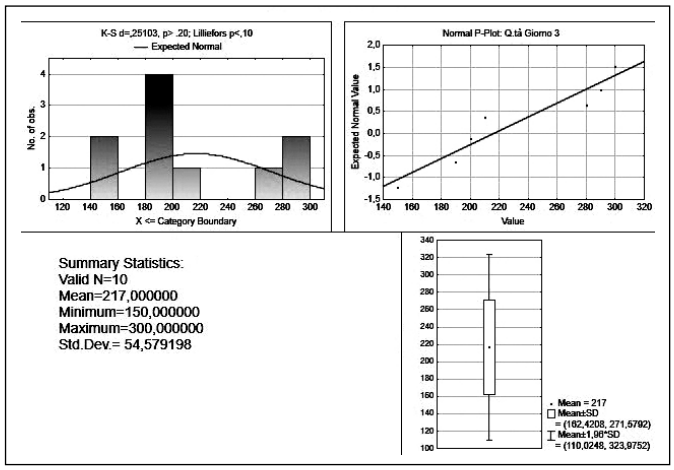

Fig. 8: Day 3 Drainage quantity under negative drainage.

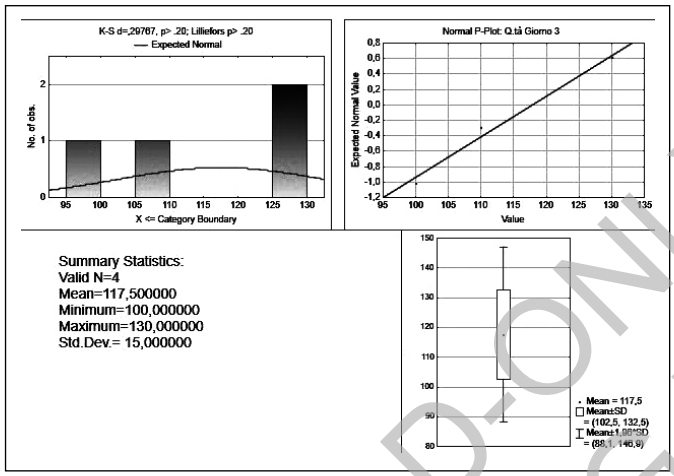

Fig. 9: Day 3 Drainage quantity under natural drainage.

vation was prolonged up to 72 hours, the average volume was 217 ml in 10 cases of suction drainage and 117.5 ml in 4 cases of natural drainage (Fig. 8, 9). The average time of hospitalization was 1.93 days and the mean operative time was 79.36 minutes. The two groups, statistically analyzed using StatSoft STATISTICA software v.10, were significant to the Student's t test (t = 3.63, p = 0.0004). None of the patients developed hematomas and/or respiratory distress and/or tetany with the exception of one case in which upon awakening, a transient bilateral paralysis of the inferior laryngeal nerve was observed and so immediately retubed, with resolution of the problem 48 hours after the surgery.

Discussion

Drains are traditionally used in the majority of surgical procedures [1-3]. The main factors that can lead to increased production of blood or serous fluid in thyroidectomy are: the size of the gland, the surgical technique, the accuracy of intraoperative hemostasis, cutting of lymph nodes and the choice of the type of drainage. Woo [4] analyzed 62 patients who underwent total thyroidectomy for papillary carcinoma from March to August 2010, divided into two groups, randomly assigning a negative drain (32 cases) and natural drain (30 cases), showed that the negative drainage can increase the production of secretions by 30%, this is caused by osmotic pressure due to the negative pressure created within the closed cavity. The paper also states that the insertion of the drainage tube may increase the volume of secretions by inducing inflammation. The amount of liquid in the drainage bag is a factor affecting on the length of hospitalization. It seems clear that if the suction drainage causes an increase in the length of hospital stay due to the increase in volume of fluid drained, this will result in increased medical costs and discomfort of the patient, as shown by Lee [5] on a study of 198 cases operated for thyroidectomy. Hurtado-López [6] had 150 thyroidectomy patients divided into 3 groups, group A without drainage, with natual drainage in group B and group C with negative drainage, noting that the selective use of drainage in thyroid surgery, increases the length of stay and that this was longer in those cases using negative drainage and that nothing can replace the accuracy and thoroughness of the surgical technique in the production of secretions. On the issue of costs Bui [7], in a study of 40 cases noted that with the same accuracy there is a net saving by using "off-the-shelf components" rather than the commercial kits. Proof that the technique and the surgical instruments used are important factors. Miccoli [8] in a study of 100 patients undergoing thyroidectomy, compared the effectiveness of the conventional technique of hemostasis (50 cases) the use of the Harmonic scalpel (50 cases), and demonstrated that the ultrasonic scalpel reduces the post-operative drained volume with a difference of about 35.3 ml between the two groups. Sanabria [9] in his meta-analysis compared the results of 11 randomized clinical trials, concluding that the use of drainage increases the time of hospitalization. In our experience drainage is generally removed after 2 days of surgery unless there is persistence of blood component in the liquid drained. The results of the measurements of drained fluid showed a difference of 24.36 ml of that drained from the natural drain and the negative drainage. After 48 hours the difference between the two methods of drainage amounted to 32.81 ml, up to a maximum difference of 99.5 ml in cases where the observation was prolonged up to 72 hours. Given the homogeneity of the thyroid treatment it seems clear how this difference in volume drained is linked to the drainage system used. In fact, we believe that it is precisely the negative pressure produced by the aspiration that continues to cause the increase of fluid drained.

Therefore, the findings from the present single-center study, we believe that the use of negative drainage after total thyroidectomy, should be abandoned. Today, in several centers [10-17], there is a tendency not to use drainage, however we believe that the removal of the thyroid gland, which leaves a residual cavity, in the first 24-48 hours can be the site of blood and/or serum collection, this is certainly influenced by the size of the thyroid gland (greater cavity) and therefore a natural drain may be, in our opinion, useful. This study is a cue for our center, to develop, in the near future, further research on selected cases with the possibility of not using any form of drainage.

Conclusion

On the basis of the findings in our study on the difference in volume drained in the two groups, the authors conclude that, certainly, for the success of the operation, maximum care should be exercised during intraoperative hemostasis as well as the surgical technique itself, and that the choice of type of drainage method to be used is the natural one, because as compared to negative drainage the volume of secretions in the 24-48 hours following the surgical operation is less and hence reduces the time of hospitalization, and consequently the total medical costs.

Authorship

S. L. collected the data, wrote the manuscript, prepared the tables, performed the Statistical analysis and formatted manuscript. D. C. has translated the manuscript. V. O. participated in drafting the manuscript. A. B. has performed surgeries, wrote the manuscript and participated in the preparation and correction of the manuscript. M. A. C. has performed surgeries, wrote the manuscript and participated in the preparation and correction of the manuscript.
All authors read and approved the final manuscript.

Riassunto

SCOPO DELLO STUDIO: Lo scopo è verificare, in rapporto al volume ematico drenato, quale drenaggio utilizzare, se in aspirazione o a caduta dopo tiroidectomia.
MATERIALI E METODI: Sono stati inseriti nello studio 141 pazienti sottoposti a tiroidectomia totale dal 22 Novembre 2012 al 7 Novembre 2013 per tireopatia plurinodulare. Per i 141 pazienti è stato utilizzato con metodo randomizzato un drenaggio a caduta a circuito chiuso (59 casi) o in aspirazione (82 casi). La valutazione del volume drenato è stata eseguita nelle 24, 48 e 72 ore successive all'intervento.
RISULTATI: La quantità di sangue drenato durante le prime 24 ore del decorso postoperatorio è stata in media 78,59 ml nei pazienti con drenaggio in aspirazione e 54,24 ml in quelli a caduta. Dopo 48 ore, nel primo gruppo il volume complessivo è stato 117,98 ml, nel secondo 85,18 ml. Nei casi in cui l'osservazione si è prolungata sino a 72 ore il volume medio è stato di 217 ml nei 10 casi in aspirazione e di 117,5 ml nei 4 casi a caduta.
CONCLUSIONI: La differenza di volume ematico osservata tra i due gruppi di pazienti con drenaggio a caduta e in aspirazione, ci induce a concludere che il drenaggio da preferire nelle tiroidectomie è quello a caduta, abbandonando il passato concetto dell'utilizzo di principio, nelle cavità superficiali, di quello in aspirazione.

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