RESEARCH ARTICLE

Early and late complications of thyroidectomy: A descriptive cohort study in Rawalpindi

Sana Viqar[1], Ayesha Masood[2], Naeem Zia[3]

Abstract

Objective: To assess the epidemiology of thyroid disorders and early and late complications following thyroidectomy.

Method: The descriptive cohort study was conducted at the Benazir Bhutto Hospital, Rawalpindi, Pakistan, from April 2017 to Janurary 2020, and comprised of patients undergoing total and near-total thyroidectomy. Post-operative complications were noted, and patients were followed up after 6 months to assess long-term complications. Data was analysed using SPSS 22.

Results: Of the 75 patients, 70(93.3%) were females and 43(58.1%) were aged <40 years. The most common symptom was neck swelling with hyperthyroidism 20(41.7%) and pressure symptom 20(41.7%). Post-operative complications developed in 26(35.6%) patients, with symptomatic hypocalcaemia being the most common 10(13.7%), followed by hoarseness 6(8.2%). Biopsy results were available for 50(66.6%) patients. Benign pathology was present in 44(88%) patients and 6(12.0%) had malignancy. Follow-up data was available for 62(82.7%) patients among whom symptomatic hypocalcaemia was the leading complication in 33(53.2%), followed by permanent hoarseness in 6(9.7%).

Conclusion: Symptomatic hypocalcaemia and hoarseness were found to be the most common post-operative and long-term complications of thyroidectomy.

Keywords: Thyroidectomy, Hypocalcaemia, Hoarseness, Complications, Malignancy.

(JPMA 72: 2184; 2022) **DOI: https://doi.org/10.47391/JPMA.3975**

Introduction

Thyroid pathology is a common cause of chronic midline swelling.[1] There are multiple thyroid disorders, and multinodular goiter (MNG) is the most common.[2] The disease may manifest with symptoms of hypothyroidism, hyperthyroidism or pressure symptoms. In Pakistan, MNG is the most common thyroid pathology.[3] Post-operative complications include stridor, haemorrhage, hypocalcaemia, recurrent laryangeal nerve (RLN) injury etc.[4] Thyroidectomy also poses a risk of long-term complications in patients.[5]

Given the prevalence of thyroid disease, it is imperative to study the local epidemiology of thyroid pathology presenting as neck swelling and to evaluate the early and late complications of thyroidectomy. The current study was planned to assess the epidemiology of thyroid disorders and early and late complications following thyroidectomy.

Patients and Methods

The descriptive prospective cohort study was conducted at the Benazir Bhutto Hospital, Rawalpindi, Pakistan, from April 2017 to Janurary 2020 after approval by Research and Ethical Committee, Rawalpindi Medical College. Patients presenting to the outpatient department (OPD) with complaint of midline neck swelling were assessed. Those with hyperthyroid features were managed medically. All pre-operative patients were assessed on the basis of history, examination and investigations, including thyroid function test, ultrasound of neck and fine needle aspiration cytology (FNAC). In some patients, thyroid scan and X-ray of the thoracic inlet or computed tomography (CT) scan of the neck were also done. Pre-operatively, indirect laryngoscopy (IDL) was peformed to document the position of the vocal cords. Informed verbal consent was taken from the patients. Patients undergoing total and near-total thyroidectomy were included using non-random consecutive sampling technique. Those undergoing any other type of thyroidectomy were excluded.

Thyroidetomy was performed using extracapsular dissection. Recurrent laryngeal nerves were identified and preserved. Tracheostomy was done in case of stridor on extubation. Post-operatively, the patients were observed for tension haematoma, hoarseness and hypocalcaemic signs. Emergency tracheostomy was performed in case of tension haematoma. For hypocalcaemic signs, Trousseau's and Chvostek's signs were checked and calcium gluconate injection (10ml of 10% Calcium gluconate diluted in 10 ml normal saline) was given over 20 minutes. Patients with hoarseness had IDL done to assess vocal cord mobility. Patients were discharged on tablet levothyroxine according to weight (1.7ug/kg) and calcium carbonate and

[1]Department of General Surgery, Pakistan Institute of Medical Sciences, Islamabad, Pakistan; [2]Department of Vascular Surgery, Combined Military Hospital, Rawalpindi, Pakistan; [3]Department of Surgery, Benazir Bhutto Hospital, Rawalpindi, Pakistan.

Correspondence: Sana Viqar. e-mail: sana.viqar27@gmail.com

vitamin D3.

The patients were followed up after 6 months of surgery to assess symptoms of hypocalcaemia, hypothyroidism, hyperthyroidism, hoarseness etc. Permanent hoarseness was defined as hoarseness persisting after 6 months of surgery. Hypocalcaemic symptoms included muscular spasm, cramps, tingling or numbness. Trousseau's and Chvostek's signs were checked. Features of thyroid symptoms included lethargy, menstrual changes, bowel changes, sleep or weight changes. Any available thyroid function test results available were also used to differentiate which patients had features of thyroid imbalance. Intake of calcium supplements and dose of thyroxine intake were also noted.

Data was analysed using SPSS 22. For scale variables, mean and standard deviation were used. For categorical variables, frequencies and percentage were used, and Fischers test was used where applicable. Level of significance was set at $p<0.05$.

Results

Of the 75 patients, 70(93.3%) were females and 43(58.1%) were aged <40 years (Table 1). The overall mean age was 38.5±12 years. Mean duration of neck swelling was 7±6.8years. The most common symptom was neck swelling with hyperthyroidism 20(41.7%) and pressure symptom 20(41.7%).

Out of the 45(%) available FNAC results, 39(86.7%) were conclusive of adenamatous colloid goiter, 4(8.9%) colloid cyst and 1(2.2%) each was hyperplastic nodule and follicular adenoma. Retrosternal growth of goiter was noted in 7(13%) patients. Patients undergoing total thyroidectomy and near-total thyroidectomy were 56(78.9%) and 15(21.1%), respectively. One patient in addition to total thyroidectomy also had median sternotomy done. Per-operatively, 5(6.8%) patients required tracheostomy. Blood transfusion was required in 4(5.5%) patients. Mean post-operative hospital stay was 4.1±4.6 days. Post-operative stay for benign and malignant disease was 3.73±3.6 and 8.00±12.8 days, respectively, but the difference was not statistically significant ($p>0.05$).

Post-operative complications developed in 26(35.6%), with symptomatic hypocalcaemia being the most common 10(13.7%), followed by hoarseness 6(8.2%), stridor 3(4.1%), seroma 2(2.7%), wound infection 1(1.4%) and others 4(5.5%). Two (2.7%) patients developed severe stridor. For both these patients, stitches were immediately removed and emergency tracheostomy was performed. One (50%) patient recovered and and diagnosis of tracheomalacia was made. While the other patient was shifted to intensive care unit (ICU) but expired on the 4th post-operative day (POD) due to brain anoxic injury. The cause was compression haematoma. All cases of post-operative stridor presented on 0 POD. Hypocalcaemic symptoms presented on 0 POD (30.0%), first POD (30.0%) and second POD (30.0%). Majority of patients with hoarseness complained on 0 POD (50.0%) while 1 (16.7%) patient each developed hoarseness on 1st and 3rd POD. Seroma and wound infections were noted on 1st POD.

Table-1: Sudy variables.

Variables		n (%)
Age category	<40 years	43 (58.1)
	>40 years	31 (41.9)
Gender	Male	5 (6.7)
	Female	70 (93.3)
City	Rawalpindi/Islamabad	39 (54.2)
	Chakwal	7 (9.7)
	Kashmir	11 (15.3)
	Kahota/Murree	5 (6.9)
	Others	10 (13.9)
Symptoms	Hyperthyroidism	20 (41.7)
	Hypothyroidism	1 (2.1)
	Pressure symptoms	20 (41.7)
	No symptoms	6 (12.5)
	Pain in swelling	1 (2.1)
Retrosternal Goiter	Yes	7 (13.0)
	No	47 (87.0)
Clinical Diagnosis	Multinodular Goiter	69 (92.0)
	Thyroid cancer suspicion	3 (4.0)
	Solitary nodule	2 (2.7)
	Recurrent Goiter	1 (1.3)
Surgery	Total Thyroidectomy	56 (78.9)
	Near-Total Thyroidectomy	15 (21.1)
Tracheostomy Required	Yes	5 (6.8)
Fluids Per- Op	1 L fluid	60 (84.5)
	2L fluid	10 (14.1)

Mean post-operative stay in patients with and without post-operative complications was 7.09±7.23 vs 2.72±0.91 days ($p=0.008$). Among patients developing post-operative hypocalcaemic symptoms, 6(60%) had positive Trousseau's sign, while 2(20%) showed positive Chvostek sign.

Follow-up data was available for 62(82.7%) patients (Figure 1) among whom symptomatic hypocalcaemia was the leading complication 33(53.2%), followed by permanent hoarseness 6(9.7%).

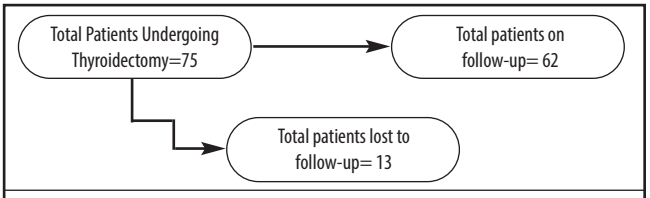

Figure-1: Study follow-up.

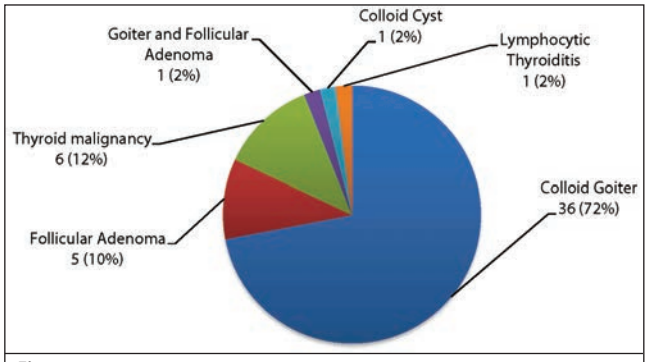

Figure-2: Frequency of histopathological diagnosis in patients undergoing thyroidectomy.

Out of the 8(80%) patients who developed post-operative symptoms of hypocalcaemia, 6(75%) had hypocalcaemic symptoms on follow-up also (p>0.05). Out of the 8(80%) patients with daily symptoms, (75%) were taking calcium supplemnts daily and 4(44%) had positive Trousseau's sign.

On follow-up, 6(9.8%) patients had Hoarseness of voice. All had documented post-operative vocal cord impairment. However, all these patients reported improvement in hoarseness compared to their initial status post-operatively. One patient with post-operative hoarseness recovered fully within 2 months. A significant association was seen between the development of permanent hoarseness and per-operative tracheostomy (p=0.048) with a relative risk of 6.8 times.

Biopsy results were available for 50(66.6%) patients (Figure 2). Benign pathology was present in 44(88%) patients and 6(12.0%) had malignancy. Most common benign pathology was colloid goiter in 36(72%). Of the 6(12%) patients with malignancy, 5(83.3%) had papillary carcinoma and 1(16.7%) had follicular carcinoma. Mean duration of neck swelling in patients with malignancy was 4.8±4.6 years and 2(2.7%) patients reported increase in symptoms within 6 months. None of the patients with malignancy had suspicion of carcinoma. Two patients with per-operative suspicion of carcinoma were diagnosed with colloid goiter (50.0%) and adenoma (50.0%) on histopathology. A total of 35 FNAC reports were retrieved, in which 32 (91.4%) showed adenomatous colloid goiter and 3 (8.6%) showed colloid cyst. Out of the available 32 FNAC reports conclusive of colloid goiter, 26(81.3%) were adenomatous colloid goiter on biopsy, 3(9.4%) were carcinoma, 2(6.3%) follicular adenoma and 1(3.1%) was lymphocytic thyroiditis. FNAC reports of the remaining 3 carcinoma cases could not be retrieved. Out of the 3 FNAC reports conclusive of colloid cyst, 1 (33.3%) was found to be colloid cyst on biopsy, 1 (33.3%) was follicular adenoma and 1 (33.3%) was goiter on biopsy report. One patient (16.7%) with papillary microcarcinoma showed additional findings of Hashimotos thyroiditis. Another patient (16.7%) with papillary carcinoma showed angioinvasion and was advised CT contrast neck due to the finding of mass in extra-thyroid tissue on follow-up. One patient with adenoma (20.0%) on biopsy was found to have a few tumour cells not invading the capsule. This patient was advised strict follow-up. All 6(100%) patients with malignancy consulted oncologists at the Nuclear Medicine, Oncology and Radiotherapy Institute (NORI) hospital regarding the need for adjuvant radiotherapy as per their indications and were managed accordingly. One patient not included in the study was a case of anaplastic thyroid cancer and was on palliative management.

Of the 62(82.7%) patients followed up, 10(20.4%) were not taking thyroxine at all. Patients having follow-up symptoms suggestive of hypothyroidism were 19(31.7%). Most common complaint was lethargy in 12 (20.3%) patients. Besides this, 4(6.7%) patients had symptoms of hyperthyroidism.

Other complaints reported by patients on follow-up were dysphagia 1 (1.6%), neck discomfort 3 (4.9%), keloid 1 (1.6%), depression 3 (4.9%) and 5 (8.2%) patients were newly diagnosed with other diseases, like diabetes, gout and chronic tonsillitis. There was no recurrence of goiter (Table 2).

Table-2: Relationship of of early and late complications with different variables.

Variables		**Presence of Post-op Complications** [n (%)]	**Permanent Hoarseness** [n (%)]	**Followup Hypocalcaemic symptoms** [n (%)]	**Thyroid Malignancy** [n (%)]
Age category	<40 years	17 (65)	4 (67)	22 (69)	3 (50)
	>40 years	9 (35)	2 (33)	10 (31)	3 (50)
Gender	Female	24 (92)	5 (83)	32 (97)	6 (100)
Retrosternal Goiter	Yes	4 (25)	1 (20)	3 (12)	1 (33)
Surgery	Total Thyroidectomy	19 (83)	5 (100)	24 (77)	5 (83)
	Near-Total Thyroidectomy	4 (17)	Nil	7 (23)	1 (17)
Tracheostomy Required	Yes	5 (20)	2 (33)	1 (3)	1 (17)
Post-Op Complications	Stridor	3 (12)	1 (17)	1 (3)	Nil
	Hypocalcaemic symptoms	10 (39)	Nil (0)	6 (19)	Nil
	Hoarseness	6 (23)	5 (83)	3 (9)	2 (40)

Discussion

Majority of patients in the current study were female, and such female predominance has been noted in other studies as well (78-89%).[6-8] Besides this, 43(58.1%) patients were aged <40 years with a mean age of 38.5±12 years. The mean age reported in other studies has been comparatively higher (39-49years).[6-8] Hyperthyroidism was the most

common symptom, followed by pressure symptoms. In another study the majority patients (34%) presenting were asymptomatic, while 29% had compression symptoms.[7] Mean duration of neck swelling was 7±6.8years which was comparable to 7.5 years in one study.[7] The mean hospitalization stay after surgery was 4 days. In literature, it has ranged between 2.5-8 days.[7,9,10] The mean post-operative period for benign and malignant disease did not differ significantly, which is in contrast to a study which showed a significantly longer stay for patients with malignant disease.[11] Similar to the current study, Tartaglia et al. showed a significant difference in the mean post-operative stay of patients developing post-operative complications and those not developing complications.[10] The current results were closer to the results of studies from Pakistan.[12,13]

In the current study, 26(35.6%) patients developed post-operative complications. All patients with stridor were symptomatic on the day of the surgery. Symptomatic hypocalcaemia was seen in 10(13.7%) patients compared to 10-25% in international studies.[8,14] The symptomatic patients had a higher frequency of positive Trousseau sign than Chovstek sign. Transient hypocalcaemia is reported to be the most common post-operative symptom following total thyroidectomy.[9] Post-operative hoarseness with documented RLN injury was seen in 6(8.2%) patients, which has been previously instead of earlier reported from 1.4% to 38.4%.[15,16] The post-operative complications can be mitigated by specialist training of surgeons and use of sub-total thyroidectomy in special circumstances. Frequency of wound infection and seroma was less in the current study (2.7% and 1.4%) compared to 6% and 3.5-6% respectively in other studies.[10,12,17]

The most common pathology was adenomatous colloid goiter (72%) comparable to another large-scale study conducted in Rawalpindi (76%).[18] Thyroid malignancy was seen in 6(12.0%) patients. Papillary carcinoma was the most common type of malignancy, as also reported previously instead of earlier.[17] In literature, thyroid malignancy has been documented up to 11%.[18] Interestingly, the patients with malignancy suspicion pre- or per-operation were found to have benign thyroid disorder on tissue biopsy. And those with malignancy on biopsy had no clinical or operative suspicion. This suggests that an index of suspicion for thyroid malignancy must always be present, particularly in those aged in their 30s and 40s.[17] Another aspect worth noting is the usefulness of FNAC in diagnosing malignancy. Out of the available reports, 3 patients with malignancy had FNAC suggestive of colloid goiter. Although FNAC is considered very accurate for differentiating between benign and malignant diseases, false negatives may still be present.[19] False negatives may be attributed to presence of microcarcinoma or malignancy with MNG.[20] One study reported incidental finding of malignancy in 6% patients[12] and another study reported 7.6% cases of malignancy with goiter.[17]

On follow-up, hypocalcaemic symptoms were most common in 33(55%) patients. While this incidence seems high, it must be noted that it was only a subjective assessment and a wide range of symptoms were included in the follow-up, with inclusivity of symptoms that occurred even 'off and on' and 'infrequently'. Out of the 33 patients, 9 patients had daily symptoms of hypocalcaemia despite taking daily calcium supplements. Like post-operative hypocalcaemia, follow-up hypocalcaemia also showed greater frequency of Trousseau's sign compared to Chvostek's. This may highlight that carpopedal spasm in positive Trousseau's sign is easier to detect than facial muscle spasm in Chvostek's sign. Six (9.8%) patients had permanent hoarseness 6 months after the surgery. Although this is higher than the average of 2.3% incidence of permanent RLN injury, range of incidence of permanent RLN injury is reported from 0 to 18.6% in literature.[15] All 6 patients with permanent hoarseness as per our definition experienced improvement compared to their initial hoarseness. We suggest a re-evaluation of permanent hoarseness one year after surgery, as is recommended by most studies.[15] There was a statistical association of permanent hoarseness and per-operative tracheostomy which is explained by RLN injury during operation which warranted a tracheostomy in the first place.

The current study highlights the lack of awareness and understanding among patients regarding the importance of continuing thyroxine after total and near-total thyroidectomy. Ten patients (20.4%) stopped taking thyroxine after the first few months following surgery without any reason. Patient education after operation and regular follow-up with thyroid function test is essential in ensuring normal QOL following thyroidectomy. Other complaints experienced by patients were dysphagia and neck discomfort. These symptoms are commonly attributed to inflammation of peri-oesophaegal muscles.[21] A few patients (5%) developed signs or symptoms of depression. Hypocalcaemia due to hypoparathyroidism may be involved in psychiatric illnesses, like depression, and the correlation must be further investigated.[22]

The current study has limitions. No formal sample size was calculated. As a result the sample population of the study was limited thereby increasing the chances of bias. Another limitation was the missing data, particularly in biopsy and FNAC reporting which also created a bias and limited the effective use of statistical tests on the results. On follow-up

patients' symptomatic hypocalcaemia was based only on subjective assessment and was not confirmed by laboratory evidence. Future studies should include laboratory workup to assess actual incidence of hypocalcaemia on follow-up. Permanent hoarseness was also not assessed with laryngoscope evidence. However, the strength of this study is a strict follow-up of patients undergoing thyroidectomy or near-total thyroidectomy and evaluating the patients holistically regarding their concerns and symptoms after undergoing surgery.

Conclusion

Post-operative symptomatic hypocalcaemia and hoarseness were the most common post-operative and long-term complications of thyroidectomy while stridor, although not common, was the most life-threatening complication. Benign thyroid disorders were common, with colloid goiter being the most common. Incidental malignancy was seen in 12% patients, in the 3rd and 4th decades of the life (as these includes ages from 30-39 and 40-49 years), hence the possibility of carcinoma must never be ruled out.

Disclaimer: None.

Conflict of interest: None.

Source of Funding: None.

References

1. Haynes J, Arnold KR, Aguirre-Oskins C, Chandra S. Evaluation of neck masses in adults. Am Fam Physician 2015;91:698-706.
2. Medeiros-Neto G. Multinodular Goiter. In: Feingold KR, Anawalt B, Boyce A, Chrousos G, de Herder WW, Dhatariya K, et al, eds. Endotext. South Dartmouth, America. MDText.com Inc, 2000. [Online] 2000 [Cited 2021 January 21]. Available from URL: https://www.ncbi.nlm.nih.gov/books/NBK285569/
3. Bukhari U, Sadiq S. Histopathological Audit of Goiter: A Study of 998 Thyroid Lesions. Pak J Med Sci 2008;24:442-6.
4. Karamanakos SN, Markou KB, Panagopoulos K, Karavias D, Vagianos CE, Scopa CD, et al. Complications and risk factors related to the extent of surgery in thyroidectomy. Results from 2,043 procedures. Hormones (Athens) 2010;9:318-25. doi: 10.14310/horm.2002.1283.
5. Ponce de León-Ballesteros G, Bonilla-Ramírez C, Hernández-Calderón FJ, Pantoja-Millán JP, Sierra-Salazar M, Velázquez-Fernández D, Herrera MF. Mid-Term and Long-Term Impact of Permanent Hypoparathyroidism After Total Thyroidectomy. World J Surg. 2020 Aug;44(8):2692-2698. doi: 10.1007/s00268-020-05531-0.
6. Rosato L, Avenia N, Bernante P, De Palma M, Gulino G, Nasi PG, et al. Complications of thyroid surgery: analysis of a multicentric study on 14,934 patients operated on in Italy over 5 years. World J Surg 2004;28:271-6. doi: 10.1007/s00268-003-6903-1.
7. Zambudio AR, Rodríguez J, Riquelme J, Soria T, Canteras M, Parrilla P. Prospective study of postoperative complications after total thyroidectomy for multinodular goiters by surgeons with experience in endocrine surgery. Ann Surg 2004;240:18-25. doi:10.1097/01.sla.0000129357.58265.3c
8. Alqahtani SM, Almussallam B, Alatawi AS, Alsuhaimi NA, Albalawi A, Albalawi NS, et al. Post-Thyroidectomy Complications and Risk Factors in Tabuk, Saudi Arabia: A Retrospective Cohort Study. Cureus 2020;12:e10852. doi:10.7759/cureus.10852
9. Bhattacharyya N, Fried MP. Assessment of the Morbidity and Complications of Total Thyroidectomy. Arch Otolaryngol Head Neck Surg 2002;128:389–92. doi:10.1001/archotol.128.4.389
10. Tartaglia F, Sgueglia M, Muhaya A, Cresti R, Mulas MM, Turriziani V, et al. Complications in total thyroidectomy: our experience and a number of considerations. Chir Ital 2003;55:499-510.
11. Goldfarb M, Perry Z, A Hodin R, Parangi S. Medical and surgical risks in thyroid surgery: lessons from the NSQIP. Ann Surg Oncol 2011;18:3551-8. doi:10.1245/s10434-011-1938-2
12. Ali MA, Raziq SR, Khan WA, Majeed S. Total Thyroidectomy for Multi Nodular Goitre. Pak Armed Forces Med J 2011;61:11-4.
13. Latif, S, Altaf H, Waseem S, Farooqui F, Altaf OS, Amir M. A retrospective study of complications of total thyroidectomy; is it a safe approach for benign thyroid conditions. J Pak Med Assoc 2019;69:1470-73.
14. Qin Y, Sun W, Wang Z, Dong W, He L, Zhang T, et al. A Meta-Analysis of Risk Factors for Transient and Permanent Hypocalcemia After Total Thyroidectomy. Front Oncol 2021;10:e614089. doi:10.3389/fonc.2020.614089
15. Jeannon JP, Orabi AA, Bruch GA, Abdalsalam HA, Simo R. Diagnosis of recurrent laryngeal nerve palsy after thyroidectomy: a systematic review. Int J Clin Pract 2009;63:624-9. doi:10.1111/j.1742-1241.2008.01875.x
16. Chahardahmasumi E, Salehidoost R, Amini M, Aminorroaya A, Rezvanian H, Kachooei A, et al. Assessment of the Early and Late Complication after Thyroidectomy. Adv Biomed Res. 2019;8:e14. doi:10.4103/abr.abr_3_19
17. Mehmood Z, Razzak SA, Baloch MN, Shahid H, Buledi RK, Javed A. Complications following completion thyroidectomy. J Surg Pak 2019;24:67-70. Doi:10.21699/jsp.24.2.4.
18. Qureshi IA, Khabaz MN, Baig M, Begum B, Abdelrehaman AS, Hussain MB. Histopathological findings in goiter: A review of 624 thyroidectomies. Neuro Endocrinol Lett 2015;36:48-52.
19. Sharma C. Diagnostic accuracy of fine needle aspiration cytology of thyroid and evaluation of discordant cases. J Egypt Natl Canc Inst 2015;27:147-53. doi:10.1016/j.jnci.2015.06.001
20. Zhu Y, Song Y, Xu G, Fan Z, Ren W. Causes of misdiagnoses by thyroid fine-needle aspiration cytology (FNAC): our experience and a systematic review. Diagn Pathol 2020;15:1. doi:10.1186/s13000-019-0924-z
21. Christou N, Mathonnet M. Complications after total thyroidectomy. J Visc Surg 2013;150:249-56. doi: 10.1016/j.jviscsurg.2013.04.003.
22. Rosa RG, Barros AJ, de Lima AR, Lorenzi W, Da Rosa RR, Zambonato KD, et al. Mood disorder as a manifestation of primary hypoparathyroidism: a case report. J Med Case Rep 2014;8:326. doi:10.1186/1752-1947-8-326.