Evacuation of postoperative hematomas after thyroid and parathyroid surgery: An analysis of the CESQIP Database ☆

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A B S T R A C T

Background: A feared complication after thyroid and parathyroid operations is postoperative hematoma that threatens the airway. The aim of this study was to identify factors associated with postoperative hematoma.

Methods: Patients undergoing thyroidectomy or parathyroidectomy were evaluated for postoperative hematoma requiring operative intervention using the database of the Collaborative Endocrine Surgery Quality Improvement Program. Associations between perioperative factors and postoperative hematoma were evaluated with bivariate methodologies and multivariable logistic regression.

Results: Among 19,356 patients, 60.4% underwent thyroidectomy ± lymph node dissection, 34.9% parathyroidectomy, and 4.7% concurrent thyroidectomy/parathyroidectomy. Postoperative hematoma occurred in 0.6% overall: 0.7% of thyroidectomies, 0.3% of parathyroidectomies, and 1.3% of combined thyroid/parathyroid operations ($P < .001$). The incidence of postoperative hematoma was greater among men ($P < .001$) and after greater operative times ($P < .001$) but was not influenced by body mass index, prior neck surgery, or reoperations.

Multivariable logistic regression determined that operative complexity, operation >1 hour, male sex, and age were independently associated with postoperative hematoma. Postoperative hematoma were associated with greater rates of other complications as well.

Conclusion: Large databases such as Collaborative Endocrine Surgery Quality Improvement Program are useful to evaluate rare complications. The risk of postoperative hematoma is associated with extent of operation, greater operative times, age, and male sex. These data may be beneficial in counseling patients and may serve as a benchmark for surgeons to evaluate their practices.

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Introduction

Over 70,000 thyroid and parathyroid operations are performed annually in the United States.[1] These operations were avoided historically in the distant past for benign disease owing to high perioperative morbidity and mortality. But with greater understanding of anatomy and pathophysiology and with meticulous technique, endocrine surgery for benign disease has become common, and the incidence of complications has diminished substantially.[2-4] Fortunately, complications after thyroid and parathyroid operations are now rare. Nevertheless, when they occur, adverse events, such as

recurrent laryngeal nerve paralysis, hypoparathyroidism, and postoperative hemorrhage, can have major adverse effects on patients' postoperative care, quality of life, and resource utilization.[1,3,5]

Bleeding after thyroid and parathyroid operations can be a life-threatening and unpredictable complication.[3,6-10] The rate of postoperative hematoma (PH) has been reported between 0.5 and 4.3%.[2,5,6,8,11] Bleeding is signaled most often by neck swelling, local pain or pressure, dysphagia, dyspnea, stridor, or respiratory distress, any of which could require prompt neck re-exploration and evacuation of the hematoma.[6,8,12] A neck hematoma may present a surgical emergency owing to direct effects on the airway or impairment of venous and lymphatic drainage that produces laryngeal edema.[8,13] Bleeding after thyroid and parathyroid operations is also associated with increased durations of stay and other complications,[14-15] with an attributable cost of $7,316 per case.[7]

The risk of PH formation after thyroid and parathyroid operations has been evaluated previously by administrative and

single-institution databases, most of which focus on bleeding after thyroidectomy alone. For this study, we used an endocrine surgery–specific database maintained by the Collaborative Endocrine Surgery Quality Improvement Program (CESQIP) to generate an updated assessment of the risks of PH among patients undergoing thyroid and parathyroid surgery by experienced endocrine surgeons. The aims of this study were 2-fold: (1) to provide an updated assessment of the risk of this complication among endocrine surgeons, and (2) to evaluate risk factors associated with this complication. We hypothesized that the extent of operation influences the incidence of PH.

Methods

CESQIP was founded in 2012 by members of the American Association of Endocrine Surgeons (AAES) to analyze and improve outcomes after endocrine operations. CESQIP is a Qualified Clinical Data Registry approved by the Centers for Medicare and Medicaid Services. The CESQIP database focuses on over 300 variables specific to endocrine surgery, including preoperative evaluation, operative details, and postoperative outcomes, for the purpose of quality improvement. Permission to use the CESQIP participant use file was granted through acceptance of a project proposal by the CESQIP Committee of the AAES and submission of a signed data use agreement. Deidentified data were transmitted securely from ArborMetrix in the form of 3 distinct modules: thyroid, parathyroid, and combined thyroid/parathyroid operations. These modules were merged for the purpose of analysis.

The CESQIP modules contain data on operations performed from January 1, 2014 to June 30, 2017. Patients were included if they underwent thyroid, parathyroid, or combined thyroid/parathyroid operations. Patients who underwent central or lateral lymph node dissection after thyroid or parathyroid operations were also included in this dataset and our analysis and were grouped accordingly based on which of the 3 CESQIP models they were included in (thyroidectomy, parathyroidectomy, or combined thyroid/parathyroid operations). Variables of interest included patient demographics, operative details, and postoperative outcomes, with the primary outcome of interest being the development of a PH that required operative evacuation. The variable of prior neck radiation was defined by the CESQIP module as prior radiation treatment or exposure to environmental radiation. When classification of operative detail or operative approach was unavailable, "unspecified" was used. Within CESQIP, the PH variable is specific to hematomas requiring formal evacuation and does not include bleeding that was managed nonoperatively. Patients were excluded from the analysis if the PH variable was absent.

Distributions of demographic information, operative details, operative approach (eg, traditional cervical incision, video assisted, or robotic), and 30-day outcomes of patients with and without PH were compared using Fisher exact test for categorical variables and analysis of variance for continuous variables. Multivariable logistic regression was performed to evaluate the influence of perioperative factors on the development of PH. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were obtained from a logistic regression multivariable model that included variables that we thought might be conceptually associated with the outcome irrespective of the statistical significance of their association in the bivariate analysis. These included body mass index (BMI) and prior anterior neck surgery. Prior anterior neck surgery is a variable within the CESQIP database that refers to any prior neck operation, not limited to the thyroid or parathyroid glands. The variable "extent of operation" was created to categorize the degree of complexity or difficulty of the operation for the purpose of the regression analysis. Patients were separated into the following groups to explore the extent of operation: initial focused

Table 1
Demographic information.

Variable	Patients with postoperative hematoma N = 118	Patients without postoperative hematoma N = 19,238	P value
Age (y), mean ± SD	53.4 ± 15.9	55.5 ± 14.4	.140
Male sex	36.4% (43)	21.5% (4,148)	<.001
Race			<.001
Asian	4.2% (5)	2.7% (521)	
Black	22.0% (26)	10.1% (1,952)	
Hispanic	8.5% (10)	10.2% (1,961)	
Nonblack	61.0% (72)	70.3% (13,531)	
Unknown	4.2% (5)	6.3% (1,208)	
BMI >40	11.0% (13)	9.7% (1,860)	.635
Prior anterior neck surgery	16.1% (19)	11.5% (2,210)	.245
Prior neck radiation	0.8% (1)	2.7% (510)	.387

Data presented as % (N).
SD, standard deviation.

(single gland) parathyroidectomy (reference), initial multiple gland parathyroidectomy, initial thyroid lobectomy, initial total thyroidectomy, initial combined thyroid/parathyroid operation, initial thyroidectomy with lymph node dissection, any reoperation on the thyroid or parathyroid glands, and patients undergoing lymph node dissections after previous thyroid or parathyroid operations. Patients with unknown lymph node dissection were excluded from the regression model. In addition to "extent of operation," operative duration, male sex, prior anterior neck surgery, BMI >40, and age were also included in the model.

Results

The dataset includes 20,980 patients who underwent thyroid or parathyroid operations. Of these subjects, 1,624 were missing the PH variable and were excluded from the analysis, leaving 19,356 patients total in the final cohort. Most patients underwent thyroidectomy (60.4%), followed by parathyroidectomy (34.9%) and combined thyroid/parathyroid operations (4.7%). PH occurred in 0.6% overall: 0.7% of thyroidectomies, 0.3% of parathyroidectomies, and 1.3% of combined thyroid/parathyroid operations.

Demographic information for patients with and without PH is presented in Table 1. Mean age, BMI, and percentage of patients with prior anterior neck operations or radiation did not differ between the 2 groups. There was a greater percentage of men compared to women in the PH group (36.4% vs 21.5%, P < .001). The distribution of race also differed significantly between the 2 groups. Although most patients in both the PH and non-PH groups were nonblack (61.0% vs 70.3%, respectively), a greater percentage of black patients was present in the PH group (22.0%) versus the non-PH group (10.1%) (P < .001).

Operative details for patients with and without PH are presented in Tables 2 and 3. In the PH group, a greater percentage of patients underwent either thyroidectomy (72.9% vs 60.3%) or combined thyroidectomy/parathyroidectomy (10.2% vs 4.6%) (P < .001, Table 3). Patients in the PH group also had greater operative time (P < .001, Table 3). No significant differences were observed between the PH and non-PH groups regarding the usage of intraoperative nerve monitoring, parathyroid autotransplantation, or the grade of the operative assistant.

There were no differences in the development of PH among patients undergoing reoperations for thyroidectomy, parathyroidectomy, or combined thyroidectomy/parathyroidectomy. Rates of PH for those undergoing reoperations followed a similar trend to those undergoing primary operation with PH rates least for reoperative parathyroidectomy (0%), followed by reoperative thyroidectomy (0.07%) and reoperative combined thyroid/parathyroid

Table 2
Extent of operation.

Variable	Patients with postoperative hematoma N = 118	Patients without postoperative hematoma N = 19,238	P value
Extent of operation			<.001
Initial focused parathyroidectomy	9.3% (11)	22.1% (4,242)	
Initial multigland parathyroidectomy	7.6% (9)	11.1% (2,133)	
Initial thyroid lobectomy	11.9% (14)	16.0% (3,070)	
Initial total thyroidectomy without lymph node dissection	36.4% (43)	29.0% (5,569)	
Initial total thyroidectomy with unknown lymph node dissection	0% (0)	0.1% (188)	
Initial combined thyroidectomy/parathyroidectomy	8.5% (10)	4.4% (839)	
Initial thyroidectomy with lymph node dissection	16.1% (19)	9.1% (1,745)	
Any reoperation or lymph node dissection only	10.2% (12)	7.6% (1,452)	

Data presented as % (N).

Table 3
Operative details.

Variable	Patients with postoperative hematoma (%) N = 118	Patients without postoperative hematoma (%) N = 19,238	P value
Category			<.001
Thyroidectomy ± lymph node dissection	0.7 (86)	99.3 (11,602)	
Parathyroidectomy	0.3 (20)	99.7 (6,743)	
Combined	1.3 (12)	98.7 (893)	
Operative time			<.001
<1 h	0.2 (10)	99.8 (4,620)	
1–2 h	0.6 (61)	99.4 (9,897)	
2–3 h	1.0 (36)	99.0 (3,425)	
>3 h	0.8 (11)	99.2 (1,296)	
Intraoperative nerve monitoring	0.7 (78)	99.3 (11,177)	.213
Parathyroid autotransplantation	0.7 (13)	99.7 (1,769)	.765
Grade of assistant			.232
Resident	64.4 (76)	63.4 (12,196)	
Fellow	22.9 (27)	23.0 (4,425)	
Co-surgeon	0 (0)	3.0 (586)	
Physician/surgical assistant	10.2 (12)	9.4 (1,805)	
Other	2.5 (3)	1.2 (226)	
Thyroid-specific details			
Primary vs reoperative surgery			.664
Primary	90.7 (78)	92.0 (10,671)	
Reoperative	9.3 (8)	8.0 (931)	
Operative detail			.435
Isthmusectomy	0 (0)	0.4 (50)	
Nodulectomy	0 (0)	0.5 (54)	
Lobectomy	24.4 (21)	30.7 (3,533)	
Subtotal thyroidectomy	0 (0)	0.9 (101)	
Total/near-total thyroidectomy	69.8 (60)	64.3 (7,397)	
Lymph node dissection only	5.8 (5)	3.2 (368)	
Unspecified	0 (0)	0.1 (99)	
Operative approach			.991
Traditional (cervical) incisions	98.8 (85)	98.9 (11,474)	
Video-assisted	0 (0)	0.0 (1)	
Remote endoscopic	1.2 (1)	1.1 (122)	
Unspecified	0 (0)	0.0 (5)	
Parathyroid-specific details			
Primary vs remedial surgery			.624
Primary	100 (20)	94.5 (6,375)	
Reoperative	0 (0)	5.5 (368)	
Number of glands excised			.001
1	57.9 (11)	67.0 (4,497)	
2	0 (0)	12.5 (842)	
3	5.3 (1)	9.3 (622)	
3.5	21.1 (4)	8.3 (558)	
≥4	21.1 (4)	2.9 (191)	
Negative exploration	0 (0)	0.5 (33)	
Operative detail			.077
Focused	45.0 (9)	55.9 (3,773)	
Bilateral	45.0 (9)	33.5 (2,257)	
Focused converted to bilateral	5.0 (1)	9.7 (652)	
Other approach for ectopic gland	5.0 (1)	0.7 (47)	
Unspecified	0 (0)	0.2 (14)	

Table 3 (*continued*)

Variable	Patients with postoperative hematoma (%) N = 118	Patients without postoperative hematoma (%) N = 19,238	P value
Combined thyroid/parathyroid-specific details			
Primary vs reoperative surgery			.110
Primary	83.3 (10)	94.3 (842)	
Reoperative	16.7 (2)	5.7 (51)	
Operative detail			.292
Isthmusectomy	0 (0)	0.5 (56)	
Nodulectomy	0 (0)	4.0 (35)	
Lobectomy	16.7 (2)	45.1 (398)	
Subtotal thyroidectomy	0 (0)	2.0 (18)	
Total/near total thyroidectomy	83.3 (10)	47.6 (420)	
Lymph node dissection only	0 (0)	0.7 (6)	
Number of glands excised			.165
1	66.7 (8)	65.5 (579)	
2	8.3 (1)	17.5 (155)	
3	0 (0)	8.9 (79)	
3.5	25.0 (3)	4.8 (42)	
≥4	0 (0)	0.4 (4)	
Negative exploration	0 (0)	1.8 (16)	
Operative-approach thyroidectomy			.869
Traditional (cervical) incision	100 (12)	98.9 (884)	
Video-assisted	0 (0)	0.0 (0)	
Remote endoscopic	0 (0)	0.2 (2)	
Unspecified	0 (0)	0.7 (7)	
Operative-detail parathyroidectomy			.429
Focused	16.7 (2)	33.5 (299)	
Bilateral	83.3 (10)	60.2 (538)	
Focused converted to bilateral	0 (0)	5.6 (50)	
Other approach for ectopic gland	0 (0)	0.4 (4)	
Unspecified	0 (0)	0.2 (2)	

Data presented as % (N)

Table 4

Multivariable logistic regression analysis—odds of PH.

Variable	OR	95% CI		P value
		Low	High	
Extent of operation				.05
Initial focused parathyroidectomy	Reference			
Initial multiple gland parathyroidectomy	1.20	0.50	2.90	
Initial thyroid lobectomy	1.70	0.70	3.80	
Initial total thyroidectomy	2.40	1.20	4.90	
Initial combined thyroid/parathyroid operation	3.20	1.30	7.70	
Initial thyroidectomy with LND	3.00	1.30	6.80	
Any reoperation or LND only	1.80	0.60	5.20	
Duration of surgery (incision to closure)				.02
<1 h	Reference			
1–2 h	2.20	1.10	4.40	
>2 h	2.90	1.30	6.10	
Male sex	2.00	1.30	2.90	<.001
Prior anterior neck surgery	1.50	0.70	3.10	.30
BMI >40	1.20	0.70	2.10	.58
Age (y)	1.01	1.00	1.03	.02

Data presented as % (N)

LND, lateral neck dissection.

operation (0.2%). Furthermore, the type of thyroidectomy (eg, lobectomy, isthmusectomy) and the operative approach (open or minimally invasive) had no significant impact on the rate of PH. The number of parathyroid glands removed had an adverse influence for the parathyroidectomy alone group; more patients in the PH group underwent 3.5- or ≥4-gland excisions compared to patients without PH ($P < .001$, Table 3). Correspondingly, bilateral neck explorations were also more common in patients who developed PH after parathyroidectomy alone ($P = .077$, Table 3).

Multivariable logistic regression was performed to evaluate the hazards of extent of operation, operative time, male sex, prior anterior neck surgery, BMI >40, and age on the development of PH (Table 4). Initial focused parathyroidectomy was chosen as the reference because clinical experience suggests that these patients are at least risk for hematoma formation. Compared to focused parathyroidectomy, the OR of PH escalated according to the extent of the operation. Although initial multiple gland parathyroidectomy, initial thyroid lobectomy, reoperative parathyroidectomy, or reoperative thyroidectomy were not associated with an increase in PH compared to initial focused parathyroidectomy, initial total thyroidectomy (OR 2.40, CI [1.20-4.90]), initial thyroidectomy with lymph node dissection (OR 3.00, CI [1.30-6.80], and initial combined thyroid/parathyroid operations (OR 3.20, CI [1.30-7.70]) were all significantly associated with increased risk of PH. Even after adjusting for extent of operation, operative duration was independently associated with increased odds of PH (Table 4). Men had twice the odds of PH compared to women, and age was also associated with PH as a continuous variable (OR 1.01, CI [1.00-1.03], $P = 0.02$). Prior neck surgery and BMI >40 were not associated with PH risk in this multivariable model.

Table 5
Association of postoperative hematoma with other complications.

Complication	Patients with postoperative hematoma (%) N = 118	Patients without postoperative hematoma (%) N = 19,238	P value
Reintubation	13.6 (16)	0.2 (31)	<.001
Tracheostomy	0.8 (1)	0.1 (22)	.021
Vocal cord dysfunction	3.4 (4)	1.6 (229)	.014
Emergency department visit	18.6 (22)	3.9 (742)	<.001
Readmission	22.9 (27)	1.7 (322)	<.001
Mortality	0 (0)	0.08 (15)	.470

Data presented as % (N)

The incidence of complications other than hematoma is presented in Table 5. Overall complication rates were greater among patients with PH. They had a greater incidence of reintubation (13.6% vs 0.2%, $P < .001$), tracheostomy (0.8% vs 0.1%, $P = .021$), vocal cord dysfunction (3.4% vs 1.6%, $P = .014$), emergency department visits (18.6% vs 3.9%, $P < .001$), and hospital readmission within 30 days (22.9% vs 1.7%, $P < .001$). As expected, the mortality rate among patients included in the CESQIP registry was very low at 0.08%. There were no deaths reported in the PH group.

Discussion

This was a large study of the development of PH after thyroid and parathyroid operations using an endocrine surgery-specific database. The PH rate within the CESQIP cohort (0.6%) is consistent with reported rates of 0.5% to 1% in most literature on the topic.[2,5-6,8,11] Similar to published data, we determined that a long operative duration,[16] age,[5] and male sex[5,7] were associated with PH and that patients with this complication had an increased incidence of other complications.[14-15] Interestingly, reoperative surgery was not a risk factor for PH in our multivariable model.

Additional risk factors for PH identified in the literature include the presence of 2 or more comorbidities,[7] usage of drains,[6,16] benign pathology,[6-7] Graves' disease, gland size,[6] and usage of suture ligation rather than monopolar or bipolar energy devices for hemostasis.[4] The increased incidence of PH with age has been attributed to the prevalence of anticoagulation agents in this population.[5] The impact of antiplatelet or anticoagulant medication usage has been studied retrospectively.[6,7,15] One investigation by Oltmann et al found that, even when medications were stopped 5 to 7 days before the operation, PH rates for patients who had taken antiplatelet agents or anticoagulants were still greater (2.2% and 10.7%, respectively) relative to those not receiving these medications (0.4%). The influence of medications seems to be greatest among patients using injectable anticoagulants; they were found to have a 29-fold increase in PH.[15] The CESQIP database contains information regarding anticoagulation usage, although this variable was not reported for most subjects and thus was not included in this analysis.

Unique to this study was the evaluation of the extent of the operation defined by several distinct categories; we observed that the hazards of PH were increased (versus parathyroidectomy alone) in patients undergoing initial thyroidectomy, initial combined thyroid/parathyroid operations, and initial thyroid operations with lymph node dissections. Moreover, our analysis demonstrated that operations of greater duration were associated with increased hazards of PH. Operative duration can be considered a surrogate measure of the operative complexity or difficulty, including size of the goiter in thyroid operations. Operative duration is also likely influenced by surgeon experience, a variable not captured by CESQIP. Previous studies have demonstrated that patients undergoing total

or subtotal thyroidectomy are at increased risk of PH relative to those undergoing thyroid lobectomy.[16-17] Few studies combine patients undergoing both thyroid and parathyroid operations within the same dataset, and these are further limited by small sample sizes.[10,18] The consideration of operative details recorded in CESQIP allowed us to critically evaluate the risk of PH for a range of operations and dissections.

Prior studies of PH after thyroid and parathyroid surgery usually have been from a single institution, limiting their sample sizes. Although large series of thyroidectomy or parathyroidectomy outcomes have been published, most of these reports derive from general surgery or medical outcomes databases. Those sources lack endocrine surgery–specific adverse results, such as postoperative laryngeal nerve dysfunction or hypoparathyroidism, which are essential quality outcomes for endocrine surgeons. Other outcomes may be misinterpreted by the application of a nonspecific database. For instance, "return to the operating room" in endocrine surgery may occur for a PH, a surgical site infection, or completion of oncologic resection. Although endocrine surgery databases provide details about the reasons for returning to the operating room, the incidence of this event for PH may be overestimated in other databases.[19] Furthermore, the usage of CESQIP or similar systems allows for evaluation of rare complications that occur even among high-volume surgeons. The CESQIP data in this series permitted an analysis of operative details and operation-specific outcomes that other databases cannot provide.

National and international databases of surgical outcomes can be powerful tools that provide a means of self-assessment for the surgeon, the institution, and the health care system at large. Participation in programs, such as the National Surgical Quality Improvement Program or Surgical Clinical Outcomes Assessment Program, provides surgeons and institutions with risk-adjusted data to advance performance.[20-21] This information offers a benchmark that may be used to improve quality of care and patient safety. The utilization of risk-adjusted data has resulted in a decrease in complications, improvement in patient care, and diminished hospital costs.[21]

There were limitations to this retrospective review. There was incomplete capture of some perioperative variables that we had hoped to include in the analysis, such as perioperative anticoagulant usage, pathology, primary diagnosis, certain postoperative complications, and long-term results. In particular, our primary outcome of interest, PH, was not reported in 7.7% of the initial dataset. It is possible that comorbidities increased the risk of PH, although details regarding specific comorbidities, such as renal failure or liver dysfunction, are not available in the database. Although the focus of this manuscript is the development of PHs that required evacuation, hematomas that were simply observed cannot be assessed in this study. Furthermore, the CESQIP database does not capture data about the timing, location, and source (eg, venous versus arterial) of PH. Data regarding gland size are not collected by CESQIP; this variable may influence the operative dissection and operative duration, both of which affect the hazards of PH. There is additionally a lack of information about surgeon volume and duration of practice. Other authors have demonstrated a relationship between surgeon and hospital volume and the frequency of complications after thyroid and parathyroid operations.[22-24] The results of this study may not be generalizable to all surgeons performing thyroid and parathyroid operations because CESQIP data are typically derived from high-volume surgeons. The data restrictions also preclude the ability to analyze how certain variables may affect the development of PH. For example, although operations of a lesser duration were associated with fewer PHs, it is impossible to establish whether this is a function of technical speed or technique, or whether this finding is related to simpler, more straightforward operations. Surgeon utilization of topical hemostatic agents may

also influence rates of PH. Details regarding anesthesia practices are not collected by CESQIP; anesthesia techniques (eg, general anesthesia versus regional/local infiltration) could result in postoperative emesis or coughing on extubation, either of which may increase the likelihood of PH formation. Lastly, unlike National Surgery Quality Improvement Program that relies on a dedicated abstractor to record data, operative information is entered into the CESQIP registry by surgeons, introducing potential bias.

Despite these limitations, we present an analysis of PH after thyroid and parathyroid operations using the CESQIP endocrine surgery database. We have evaluated the hazards associated with varying degrees of operative complexity and have shown that patients undergoing thyroidectomy with or without concurrent lymph node dissection and combined thyroid/parathyroid operations are at increased risk of PH compared with initial parathyroidectomy. In addition, the analysis has demonstrated increased odds of PH associated with age, male sex, and operations of greater duration. During preoperative discussions, surgeons typically counsel patients that the likelihood of an early postoperative neck reexploration being necessary to evacuate a hematoma is uniformly about 0.5% to 1.5%. The information in this series may better guide these discussions, with an appreciation that certain factors, particularly escalating extent of operation, predispose some patients to a greater risk of PH development. Analyses of CESQIP and similar databases are valuable to establish benchmark assessments of rare complications.

Disclosure

CESQIP and the hospitals participating in CESQIP are the source of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors. The conclusions, findings, and opinions expressed by the authors do not necessarily reflect the official position of the AAES or CESQIP. Use of CESQIP data does not imply endorsement by any of the groups named above.

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Discussion

Dr Electron Kebebew (Stanford, CA): I really enjoyed your presentation. An informative study. I'm really glad to see that CESQIP generated some good data.

I have a couple of questions for you:

Number one, when you say postoperative hematoma, was it only those patients that required decompression?

Dr Stephanie D Talutis: Yes, in the CESQIP module, the hematoma variable is specific to only those who require operative evacuation.

Dr Electron Kebebew (Stanford, CA): Second, some of the factors you are reporting are associated with a high risk of hematoma are puzzling to me. For example, male sex. I always learned that women do better than men, but can you perhaps speculate why that is? I think in your earlier slides, black patients also had a higher postoperative hematoma rate.

Lastly, regarding histology and diagnosis. Do Graves' patients have a higher rate of postoperative hematoma?

Dr Stephanie D Talutis: With regards to male sex, that's been reported in some other papers on the subject. In looking through the literature, no one has really speculated as to why men have a higher hematoma rate, but it has been reported in other datasets.

With regard to race, we suspect that there are some other social or demographic variables that are not collected by CESQIP. I mentioned in the limitations that we do not know comorbidities. So it is possible that end-stage renal disease in the black patients could have impacted why we saw that relationship when we broke it down by race, but we are missing some of those variables.

And to your last question, we were unable to include diagnosis and pathology in our analysis due to the means by which they are recorded in CESQIP. When I looked at the number of primary diagnoses, there were 23 different categories of diagnoses. So this limited how we were able to add that information to our dataset.

Dr. Bradford Mitchell (Lansing, MI): I noticed that you had a number of patients that had greater than 3-and-a-half-gland parathyroidectomy. Did you exclude secondary hyperparathyroidism?

Dr Stephanie D Talutis: We do not know which patients had that diagnosis, unfortunately.

Dr Bradford Mitchell (Lansing, MI): The data field for renal failure might be a reasonable exclusion. You said you didn't have the data regarding timing of the hematoma formation and evacuation. I would hope CESQIP might add that to the dataset. Do you know the percentage of the patients that were done as an outpatient?

Dr Stephanie D Talutis: We do not know that information.

Dr Bradford Mitchell (Lansing, MI): The last question. Was there any record of the technique of closure to the strap muscles?

Dr Stephanie D Talutis: No, that information is actually not collected by CESQIP either, but it is an important limitation as well. Some of the operative variables and even anesthetic choices could play a role in the hematoma rates.

Dr Bradford Mitchell (Lansing, MI): So the AAES guidelines regarding outpatient thyroid/parathyroid surgery recommended not having the strap muscles completely closed, and that could allow limited hematomas that did not require reoperation.

Dr Jennifer Rosen (Washington, DC): Thank you for a very nice presentation, and nice use of the emerging CESQIP data.

One question. I have had 0 hematomas in 13 years, or so I might report. So did you try to accommodate for the limitations of self-reported data? Were you able to analyze by region in the United States? So, for example, the East Coast versus the West Coast? Or could you get more granular data such as individual surgeon or institutional data?

Dr Stephanie D Talutis: We do not have the information with regard to region or as it relates to surgeon volume or hospital volume, but all of those are excellent points.

Dr Toni Beninato (New York, NY): I know that you said that your overall risk of hematoma was 0.6%, but that it was higher risk in more extensive procedures. Are you able to calculate a specific risk of hematoma in those procedures if you exclude the other procedures?

Dr Stephanie D Talutis: If we excluded the lower-risk patients? Is that the question?

Dr Toni Beninato (New York City, NJ): I'm just wondering how you are going to counsel your patients going forward for those procedures that you deem higher risk for hematoma.

Dr Stephanie D Talutis: That is a great question. We did not calculate a specific risk score with our data, but we did find that an initial thyroidectomy, thyroidectomy with lymph node dissection, and the combined thyroid/parathyroid operations were the ones that had the increased risk.

Additionally, we found that the operative time (although that might not be something that you can predict in the office when counseling the patients) may be important. Those patients would perhaps need additional monitoring in the postoperative period if you were considering an outpatient thyroid operation.

Dr Toni Beninato (New York, NY): Was age a surrogate for aspirin use? Were you able to control for that independently?

Dr Stephanie D Talutis: Age was reported as a continuous variable in the dataset. There is a variable in CESQIP where you can report the use of preoperative anticoagulants, but unfortunately that variable was not reported in a substantial number of the patients in the cohort so we could not use it.

Dr Roger Tabah (Montreal, Canada): I may have missed this in the presentation. Was there a critical time for hematoma formation? For example, how many hours following surgery?

Dr Stephanie D Talutis: Unfortunately, that is not captured by CESQIP, but I think that is an important variable that we need in order to determine which patients might be safe for outpatient thyroid surgery.