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Antibiotic prophylaxis for clean neck surgery

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ABSTRACT

The frequency of surgical site infections (SSIs) after clean neck surgery is low and antibiotic prophylaxis is not recommended. This retrospective study investigated the effect of perioperative prophylactic antimicrobial therapy on the development of infections. A total of 807 consecutive patients undergoing clean neck surgery were included in the study. Antimicrobial prophylaxis with intravenous cefuroxime was administered in 518 cases. Although patients who received prophylaxis had a lower rate of SSIs than those who did not receive antibiotics, this was not statistically significant (0.4% vs 1.4% respectively, p=0.19). Older age was the only variable associated with the development of SSIs (p=0.014).

KEYWORDS

Antibiotics – Clean neck surgery – Infection

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Clean neck operations (thyroidectomy, parathyroidectomy and lymph node resection) are among the most common operations performed worldwide. Most guidelines do not recommend the routine use of perioperative antimicrobial prophylaxis for these procedures[1,2] because the frequency of surgical site infections (SSIs) is generally low (<1%).[3,4] However, prophylaxis is still often used in these cases as some surgeons and anaesthetists feel that this advice is not appropriate for a part of the globe in which multidrug resistant infections are endemic. In this context, we studied the frequency of postoperative infections after clean neck surgery and examined the effect of perioperative prophylactic antimicrobial therapy on the development of infections.

Methods

This was an observational, retrospective study performed in a 140-bed private clinic (Department of Endocrine Surgery, Central Clinic) in Athens, Greece, over a 5-year period (2010–2014). The study was approved by the clinic's ethics committee. All patients undergoing clean neck surgery (regardless of age, sex and co-morbidity) were included.

All operations were performed by the same primary surgeon and surgical team. Apart from the primary operator, there were also three assistants and one of two anaesthetists. Administration of perioperative prophylaxis was at the discretion of the anaesthetist. The first anaesthetist did not provide antibiotic prophylaxis in any patient while the second administered antibiotics to all patients. Selection of the anaesthetist was independent of patient characteristics and operation plan. All data were retrieved from patient files. The patients were divided into two groups based on whether antimicrobial prophylaxis was administered. Among the patients in the antibiotics cohort, only those who received intravenous cefuroxime were studied. The primary outcome was the rate of SSIs or remote infections.

Statistical analysis

All analyses were carried out with SPSS® version 17.0 (SPSS, Chicago, IL, US). Normality of distribution for continuous variables was assessed using the Kolmogorov–Smirnov test. For normally distributed variables, Student's t-test was employed whereas for non-normally distributed variables, the Mann–Whitney U test was used. When analysing categorical variables, the chi-squared test, Fischer's exact test or the Monte Carlo test was employed as appropriate. A p-value of <0.05 was considered statistically significant.

Results

During the study period, 849 patients underwent surgery. Of these, 34 were excluded because data were missing, 7

Table 1 Summary of patient characteristics, antibiotic administration, procedure and disease type

	Infection (*n*=6)	No infection (*n*=801)	*p*-value
Median age (range)	63 yrs (54–72 yrs)	49 yrs (16–91 yrs)	0.017
Female	5/6 (83.3%)	638/801 (79.7%)	1.00
Median operative time (range)*	149 mins (120–290 mins)	158 mins (68–550 mins)	0.92
Cefuroxime	2/6 (33.3%)	516/801 (64.4%)	0.19
Second antibiotic dose*	1/6 (16.7%)	128/765 (16.7%)	1.00
Surgery type			0.73
Total thyroidectomy	5/6 (83.3%)	616/801 (76.9%)	
Parathyroidectomy	0/6 (0%)	85/801 (10.6%)	
Neck dissection	1/6 (16.7%)	70/801 (8.7%)	
Follow-up probe	0/6 (0%)	19/801 (2.4%)	
Other	0/6 (0%)	11/801 (1.4%)	
Disease type			0.72
Cancer	3/6 (50.0%)	360/801 (44.9%)	
Papillary thyroid cancer	3/6 (50.0%)	338/801 (42.2%)	
Medullary thyroid cancer	0/6 (0%)	19/801 (2.4%)	
Other	0/6 (0%)	3/801 (0.4%)	
Non-cancer	3/6 (50.0%)	441/801 (55.1%)	
Multinodular goitre	2/6 (33.3%)	238/801 (29.7%)	
Graves' disease	1/6 (16.7%)	32/801 (4.0%)	
Primary hyperparathyroidism	0/6 (0%)	100/801 (12.5%)	
Toxic multinodular goitre	0/6 (0%)	24/801 (3.0%)	
Toxic thyroid adenoma	0/6 (0%)	10/801 (1.2%)	
C cell hyperplasia	0/6 (0%)	9/801 (1.1%)	
Atypical neoplasm	0/6 (0%)	8/801 (1.0%)	
Hürthle cell neoplasm	0/6 (0%)	8/801 (1.0%)	
Other	0/6 (0%)	12/801 (1.5%)	

*Data available for 771 patients

because they received antibiotics other than cefuroxime and 1 because a non-infectious inflammatory process evolved (seroma). This left 807 cases for analysis. Table 1 summarises the patient characteristics, antibiotic administration, operative time from incision to wound closure, procedure details and disease type for patients with and without SSIs. The majority (77%) of patients in the study underwent total thyroidectomy.

Six patients (0.7%) developed an infection (all SSIs). Antibiotic prophylaxis was administered in 518 cases. Although patients who received prophylaxis had a lower rate of SSIs than those who did not receive antibiotics, this was not statistically significant (2/518 [0.4%] vs 4/289 [1.4%] respectively, p=0.19). On univariate analysis, older age was the only variable associated with development of SSIs (p=0.017). Following multivariate analysis, age was still associated with infection (p=0.014).

In the group with postoperative infections, four patients were aged over 65 years and five were female. Five patients were overweight with minor other co-morbidities (Table 2). Five patients had undergone total thyroidectomy for multinodular goitre. Two required readmission for surgical and/or intravenous antibiotic treatment while the remaining four were treated with oral antibiotics at home.

Discussion

Only few infections developed postoperatively in our cohort, similar to other reported studies.[5,6] In the present study, there was no association between prophylaxis with cefuroxime and postoperative infection. In addition, the infections were mild and all subsided without further sequelae. The only variable associated with development of infection was older age. Our findings are limited by the retrospective study design (prone

Table 2 Characteristics and treatment of patients with surgical site infections following clean neck surgery

Patient	Age / sex	Weight	Diagnosis / surgery / operative time	Co-morbidity	Treatment	Readmission
1	72 F	78kg	Papillary carcinoma; thyroidectomy, 154min	Hypertension, dyslipidaemia	Surgery plus antibiotics	No
2	67 F	78kg	Multinodular goitre; thyroidectomy, 120min	Hypertension, dyslipidaemia	Antibiotics	No
3	62 F	62kg	Graves' disease; thyroidectomy, 141min	Hypertension, venous insufficiency	Antibiotics	Yes
4	54 F	75kg	Papillary carcinoma; thyroidectomy, 144min	Hypertension, dyslipidaemia	Antibiotics	No
5	60 F	75kg	Multinodular goitre; thyroidectomy, 178min	None	Antibiotics	No
6	64 M	92kg	Papillary carcinoma; thyroidectomy, 290min	Obesity	Surgery plus antibiotics	Yes

to bias due to confounding, selection of participants, missing data, selection of reported results etc) and the relatively small number of patients. (The power of this study to detect a statistically significant difference was only 21%.)

The outcomes of our study are in agreement with those of a randomised controlled trial published in 2009 reporting no difference in the frequency of development of SSIs after thyroidectomy between patients receiving antibiotic prophylaxis with ampicillin/sulbactam and those having no prophylaxis.[7] The findings are also in agreement with guidelines that routine antibiotic prophylaxis in clean neck surgery does not reduce the risk of SSIs.[1] Furthermore, the severity of the SSIs was low and all responded to surgical or antibiotic treatment. Nevertheless, physicians should be aware that severe or even fatal SSIs may develop.[8]

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