ORIGINAL ARTICLE

Trends in frequency of surgical procedures at Department of Otorhinolaryngology and Maxillofacial Surgery of Mostar University Hospital, Bosnia and Herzegovina (2013-2017)

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ABSTRACT

Aim To determine whether there has been a change in frequency of selected otorhinolaryngology - head and neck surgical procedures during a 5-year period.

Methods Comparative cross-sectional analyses of surgical candidates and procedures performed at the Department of Otorhinolaryngology and Maxillofacial Surgery during the period 2013–2017 were done. Data on patients' demographics and cases of selected surgical procedures were extracted from the operating room log books. Patients' average age, male:female ratio, and the percent share of all surgical procedures for each selected surgical procedure for each studied year were calculated.

Results In comparison with the year 2013, the year 2017 showed no significant difference in age or sex of patients who underwent selected surgical procedures, increase of the number of all operations and the number of investigated selected operations, increase in the share of tonsil surgery, nasal septum and pyramid surgery, nasal polyposis surgery, parathyroid gland surgery, otoplasty, cochlear implantation, laryngeal surgery, and tracheotomy, and decline in the share of thyroid gland surgery, middle ear microsurgery, neck dissection, surgery of parotid gland, and surgery of neck cysts.

Conclusion Our finding of variations in utilization of some studied procedures provides a basis for future discussions, research and provision of health care services. Used data are specific to two studied cantons and do not represent a nationally representative database. The generalisability of the present results to Bosnia and Herzegovina as a whole might be limited. Therefore, similar future investigations conducted in other large hospitals in our country are warranted.

Key words: head, neck, incidence, operative procedures, otorhinolaryngology

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INTRODUCTION

Surgical care, long time ago mentioned as the ‘‘neglected stepchild’’ of global health, is an important component of health-care systems. In the study on estimated need for surgery worldwide based on prevalence of diseases in 2010, Rose et al. (1) reported the estimated need for one surgical procedure per 21 people alive and a global rate of surgery of 4664 per 100,000. Surgical need and frequency of surgical procedures vary between countries according to the size of the population, the incidence of the disease or injury, differences in medical attitudes and practices between states, and the availability of material and human resources. The Eurostat report (2) for the period 2010-2015 has provided information about increasing and decreasing surgical procedures. Out of 20 the European Union Member States with available data, 12 States showed a decline in the frequency of tonsil surgery, while increases were observed in eight States. Out of 14 Member States with available data, seven of them reported a decrease in the frequency of thyroidectomy, the remaining seven States recorded an increase. Cochlear implantation was one of the two procedures with the most rapid increase (2).

Data on trends in head and neck surgery in Bosnia and Herzegovina (B&H) are insufficient. We conducted this study in order to gain knowledge about trends in frequency of selected head and neck surgical procedures in B&H. We hope that our findings could be useful for policy makers, health-care administrators, and ministries of health in planning material and human resources for otorhinolaryngology - head and neck surgery units. Therefore, the aim of this study was to determine whether there has been a change in frequency of selected head and neck surgical procedures performed at the public tertiary hospital during the period 2013–2017.

PATIENTS AND METHODS

Patients and study design

The single-centre retrospective cross-sectional study was conducted in the public government-owned tertiary hospital which has a catchment population in excess of 310,000 patients. Comparative cross-sectional analyses of surgical candidates and procedures performed at the Main Operating Theatre of the Department of Otorhinolaryngology and Maxillofacial Surgery of Mostar University Hospital, Bosnia and Herzegovina (B&H) during the period 2013–2017 were done. Surgical procedure was defined as any intervention occurring in a hospital operating theatre involving incision, excision, manipulation or suturing of tissue, usually requiring regional or general anaesthesia (1). Surgeries performed at the Minor Operations Theatre were not included in the analysis.

Methods

Data on patients’ demographics and cases of selected surgical procedures were extracted from the operating room log books. Patients’ average age, male:female ratio, and a percent share of all surgical procedures for each selected surgical procedure for each studied year were calculated. The calendar years of the 5–year study period were compared according studied parameters. Data on the number of registered subjects with health insurance were obtained via official communication with the Health Insurance Fund of the Herzegovina-Neretva Canton and the Health Insurance Fund of the West Herzegovina Canton.

Statistical analysis

Comparison of the central location of two independent variables was done using the Student’s *t*–test for variables not showing statistically significant deviation from Gaussian distribution on the Kolmogorov-Smirnov test. The chi-square test for significance was used to evaluate relationships between nominal variables. *P*–values <0.05 were regarded as being statistically significant.

RESULTS

During the 5-year period there were 2033 selected surgical procedures, which represented 57.1% of 3558 all surgical procedures performed. The selected surgeries were performed on 1897 patients, 992 (52.29%) males and 905 (47.70%) females, aged 33.12 ± 23.20 (mean±SD) years (ranging from 1 to 93 years) (Table 1). The highest proportion of the patients was in the first decade (22.59%) and in the second decade of life (14.83%). There were no significant differences in patients’ age (p=0.340) or gender (p=0.18) between the year 2013 and the year 2017.

Table 1. Subjects with health insurance, performed surgical procedures and surgical candidates during the period 2013-2017

	The studied years					Total
	2013	2014	2015	2016	2017	
No of subjects with health insurance*	267,308	272,143	273,450	271,372	270,494	1,354,767
No of all surgical procedures	651	746	701	726	734	3558
No of all surgical procedures per 10,000 insurees	24.4	27.4	25.6	26.8	27.1	26.2
No of selected surgical procedures†	356	451	345	415	466	2033
Surgical candidates‡	324	424	330	392	427	1897
Males / females (absolute number)‡	175/149	240/184	155/175	184/208	238/189	992/905
Male:female ratio‡	1.17 : 1	1.30 : 1	0.88 : 1	0.88 : 1	1.25 : 1	1.09 : 1
Age in years (mean±SD) ‡	34.81± 23.06	33.85±2 4.01	29.73 ± 22.46	33.4 ± 23.01	33.59± 23.08	33.12± 23.20
Age range in years (min–max)‡	2 - 87	3 – 82	3 - 92	1 - 93	1 - 82	1 - 93

*Refers to the Herzegovina-Neretva Canton and the West Herzegovina Canton; †see Table 2; ‡Refers to the selected surgical procedures only

Both the absolute number of all operations (an increase of 83) and the number of all operations per 10,000 insurees (an increase of 2.7) rose between 2013 and 2017 (Table 1). Also, the absolute number of all studied selected operations (an increase of 110), as well as the percent share of all surgical procedures for the whole selection (an increase of 9%), rose between 2013 and 2017 (Table 2).

Tonsil and adenoid surgery, thyroid surgery, and laryngeal surgery were the categories with the greatest shares of 17.11%, 8.91%, and 5.95%, respectively. The most infrequent categories were submandibular gland surgery, cochlear implantation, and neck cyst removal surgery with the shares of 0.05%, 0.16%, and 1.43%, respectively. A sharp rise in cochlear implantation from only one procedure during 2013–2015 to five procedures in 2016 and 2017 was found. The frequency of surgical corrections of nasal pyramid and septum has almost doubled (from 22 procedures in 2013 to 43 procedures in 2017) during the studied period. This category was represented in 4.27% cases of all surgical procedures. The number of lop ear corrections, a category with the share of 5.22% of all surgeries, increased from 29 procedures in 2013 to 45 procedures in 2017 (Table 2).

The share of tonsil and adenoid surgery increased from 14.3% in 2013 to 17.5% in 2017. The share of adenoidectomy remained stable during the studied period (Figure 1).

The share of all thyroid operations slightly declined from 8% in 2013 to 7.5% in 2017. It is worth noting that the share in 2016 was 10.9%. There was a decline in the share of total thyroidectomies (from 4.3% in 2013 to 3.4% in 2017) and a rise in the share of lobectomies (from 3.7% in 2013 to 4.1% in 2017). Parathyroidectomy had the share of 1.68% of all surgeries. The number of parathyroidectomy events increased sharply from 2013 (six procedures) to 2014 (15 proce-

Table 2. Selected surgical procedures during the period 2013-2017

Selected surgical procedures	No (%) of all surgical procedures performed during a single year					% change in annual number of procedures, 2017 vs. 2013
	2013	2014	2015	2016	2017	
Tonsillectomy	26 (4)	40 (5.4)	21 (3)	32 (4.4)	32 (4.4)	23.1
Adenoidectomy	52 (8)	54 (7.2)	58 (8.3)	57 (7.9)	57 (7.8)	9.6
Adenotonsillectomy	15 (2.3)	49 (6.6)	39 (5.6)	38 (5.2)	39 (5.3)	160
All tonsil and adenoid surgeries	93 (14.3)	143 (19.2)	118 (16.8)	127 (17.5)	128 (17.5)	37
Septoplasty and/or Rhinoplasty	22 (3.4)	32 (4.3)	31 (4.4)	24 (3.3)	43 (5.9)	95.4
Nasal polyposis surgery	21 (3.2)	24 (3.2)	9 (1.3)	15 (2.1)	30 (4.1)	42.8
Total thyroidectomy	28 (4.3)	35 (4.7)	36 (5.1)	37 (5.1)	25 (3.4)	-10.7
Thyroid lobectomy	24 (3.7)	33 (4.4)	20 (2.9)	42 (5.8)	30 (4.1)	25
All thyroid surgeries	52 (8)	68 (9.1)	56 (8)	79 (10.9)	55 (7.5)	5.7
Parathyroidectomy	6 (0.9)	15 (2.0)	12 (1.7)	13 (1.8)	14 (1.9)	133
Lop ear correction	29 (4.5)	40 (5.4)	38 (5.4)	34 (4.7)	45 (6.1)	55.1
Middle ear microsurgery	21 (3.2)	13 (1.7)	17 (2.4)	16 (2.2)	18 (2.5)	-14.2
Cochlear implantation	1 (0.2)	0	0 (0)	2 (0.3)	3 (0.4)	200
Laryngeal surgery	41 (6.3)	47 (6.3)	21 (3)	44 (6.1)	59 (8)	43.9
Neck dissection	29 (4.5)	28 (3.8)	14 (2)	21 (2.9)	30 (4.1)	3.4
Tracheotomy	17 (2.6)	21 (2.8)	11 (1.6)	8 (1.1)	23 (3.1)	35.2
Parotidectomy	11 (1.7)	12 (1.6)	10 (1.4)	16 (2.2)	10 (1.4)	-9
Submandibular gland surgery	0	1 (0.1)	1 (0.1)	0 (0)	0 (0)	0
Neck cyst removal surgery	13 (2)	7 (0.9)	7 (0.9)	16 (2.2)	8 (1.1)	-38.4
All selected surgical procedures	356 (54.7)	451 (60.45)	345 (49.2)	415 (57.2)	466 (63.5)	31.2

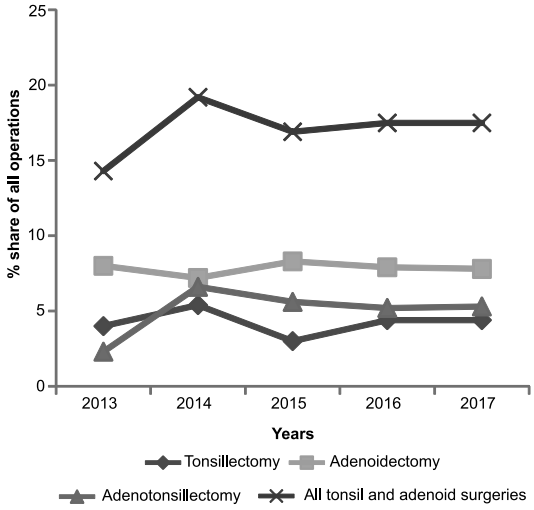

Figure 1. Tonsil and adenoid surgery, 2013-2017

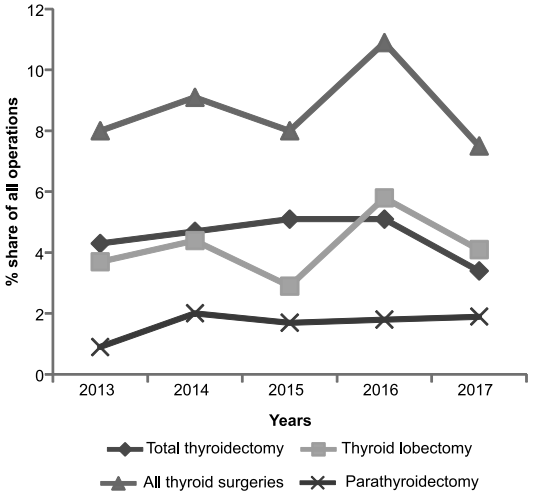

Figure 2. Thyroid and parathyroid gland surgery, 2013-2017

dures) and has been relatively stable since that time. Out of total of 60 parathyroidectomies during the period 2013–2017, there were only seven operations for secondary hyperparathyroidism. In 2013, 2014, 2015, 2016, and 2017, there were 0, 4, 1, 1, and 1 surgical candidates with secondary hyperparathyroidism, respectively. We did not find any significant annual differences in the number of patients receiving dialysis at the Centre for Hemodialysis of the studied hospital. In 2013, 2014, 2015, 2016, and 2017, there were 31, 27, 26, 33, and 25 new dialysis patients, respectively (Figure 2).

DISCUSSION

The results of this study showed that in comparison with the year 2013, the year 2017 showed an increase of the number of all operations and the number of investigated selected operations, no significant difference in age or sex of patients underwent selected surgical procedures, increase in the share of tonsil surgery, nasal septum and nasal pyramid surgery, nasal polyposis surgery, parathyroid gland surgery, lop ears correction, cochlear implantation, laryngeal surgery, and tracheotomy, and decline in the share of thyroid gland surgery, middle ear microsurgery, neck dissection, surgery of parotid gland, and surgery of neck cysts.

There is anecdotal evidence that a number of persons have left the country and moved to high-income countries after the last census of population in 2013. Reliable data on population size of the studied region for each year of the period studied were not available. Therefore, we have used the number of the insurees registered at the government-owned health insurance fund as a proxy for change in population size in each studied year. There were 3,186 insurees more in 2017 than in 2013. We assume that this increased number of the registered insurees is more likely to be a marker for the higher discipline of companies and employees in paying for health insurance rather than a consequence of an increase of population size in the studied cantons. Therefore, we used a percent share of all surgical procedures for each selected surgical procedure for each studied year for the demonstration of trends in frequency.

The highest proportion of the patients in the first two decades of life can be explained by the fact that tonsil and adenoid surgery, the category with the greatest share among the selected procedures in our study, is mostly performed in children (3). In 2012, tonsillectomy and/or adenoidectomy were the fourth most common indication for hospital admission in patients aged 1-17 years in the United States (3). Historically, there were variations in the performance of adenotonsillar surgery. In 1931, there were ten times as many tonsillectomies per 1,000 males in the United States as in 1910 (4). In the United States, the number of tonsillectomies decreased from 1,400,000 in 1959 to 260,000 in 1987 (5). The Eurostat found a wide variation in the frequency of tonsillectomies among European States (2). Scandinavian high-income States with strong historical, cultural and linguistic ties have shown opposite trends; between 2010 and 2015, there was an increase over 20% in Sweden

and a decrease over 40% in Denmark (2). Indications for tonsillectomy and/or adenoidectomy have evolved from being primarily related to adenotonsillar infections to being more commonly caused by oronasal obstruction. In the United States, forty years ago, 90% of tonsillectomies in children were performed for recurrent adenotonsillitis; now it is about 80% for obstructive sleep problems and 20% for infection (6). The share increase of tonsil and adenoid surgery in our hospital might have been a consequence of the increased number of patients with obstruction as an indication. After the Centre for Sleep Medicine at our Department of Otorhinolaryngology and Maxillofacial Surgery was founded in 2014, several symposia on obstructive sleep apnea for medical professionals and laypersons were held in our city. Since then, obstructive sleep apnea has been a popular topic in the local media. The aforementioned factors might have increased a recruitment of new surgical candidates with obstructive/sleep disordered breathing indications. Our results are consistent with the reports on the frequency of tonsillectomies from the countries in the region. Slovenia (2010-2015), Croatia (2012-2016), Serbia (2014-2015), and Macedonia (2010-2015) showed an increase of 18.2%, 42.5%, 3.3%, and 30.1%, respectively (2).

In many countries, thyroid gland surgery is an increasing procedure. Rising thyroid cancer incidence has resulted in the increased frequency of thyroidectomy (7,8). Improved detection has been responsible in part for the observed increase in the incidence of thyroid cancer (8). In the United States, the number of thyroid nodule-related operations increased by 31% between 2006 and 2011 (7). The reports from countries in the neighbourhood were heterogeneous. In Macedonia (2010-2015) and Croatia (2012-2015) there were large increases of 69.5% and 66.4%, retrospectively (2). Slovenia (2010-2015) reported a slight increase of 4.4%, while Serbia (2014-2015) had a slight decrease of 5.34% in the frequency of thyroidectomy (2). In our hospital, we found a slight decline in thyroid surgery. Due to improved detection, we have expected continuous rise in the share of thyroid operations. In the Herzegovina-Neretva Canton and the West Herzegovina Canton, the number of high-sensitivity sonographic devices and the number of skilled professionals for thyroid sonography, thyroid fine-needle aspiration biopsy, cytological analysis or thyroid surgery have been increasing during the last decade. These factors might have resulted in an easier and better access to improved diagnostic evaluation of thyroid disorders. We are interested in studying a frequency of thyroid surgery in the future in order to determine whether the current slight drop in 2017 is an accident or a sign of permanent decline trend in thyroid operations in our region. Further, thyroidectomy-to-lobectomy ratio was analysed. In our hospital, a decline in the share of total thyroidectomies and a rise in the share of lobectomies may indicate a trend toward a less radical surgical approach to treatment of the thyroid disease. On the contrary, in the United States, the number of total thyroidectomies increased by 59%, while lobectomies increased only 7% between 2006 and 2011 (7).

In the comparison with traditional operations, the absolute number of cochlear implantations is relatively low, but the large and rapid increases in this procedure were reported in most countries. Out of 13 EU Member States with available data for the period 2010-2015, only one State reported a decrease in the frequency of cochlear implantations (2). In the neighbourhood, the number of cochlear implants quadrupled in Slovenia and tripled in Macedonia between 2010 and 2015 (2). The sharp decline was observed in Croatia. The number of cochlear implantations dropped from 73 in 2012 to 27 in 2015 (2). In Serbia, there were 34 and 33 procedures in 2014 and 2015, retrospectively (2). Our study showed a sharp rise in this procedure in the hospital.

Although the number of nose reshapings decreased by 1% between 2013 and 2017, it is still the third most common cosmetic surgical procedure in the United States (9). In the United Kingdom, rhinoplasty was the fifth most common cosmetic surgical procedure in 2013 and 2017 but the number of rhinoplasties showed a fall of 77% during 2013–2017 (10). In our hospital, the number of nose reshapings increased during the studied period. A similar large increase was also observed for lop ear corrections. Ear and nose reshapings are a popular topic in the media. We surmise that a frequent appearance of these procedures in the media resulted in their popularisation and in an increased recruitment of surgical candidates requesting ear or nose correction. Between 2013

and 2017, the number of otoplasties dropped by 3% and 20% in the United States and the United Kingdom, respectively (9, 10). This decline in some cosmetic surgical procedures in some developed countries may be explained in part by the influence of social media celebrities who promote a natural look.

Parathyroidectomy is a decreasing surgical procedure in the United States. Between 2002 and 2011, the number of parathyroidectomies for primary and secondary hyperparathyroidism decreased by 27% (11,12). In contrast, a significant increase in the frequency of parathyroidectomy in adults was reported in England and Wales. The rate of parathyroidectomy procedures rose from 3.3 in 2000 to 5.8 procedures per 100,000 individuals in 2010 (13). The initial increase in the frequency of parathyroidectomy in our hospital has been primarily affected by a rise in number of surgical candidates with primary hyperparathyroidism. We are not aware of any evidence for changes in factors that may have led to this increase, such as surgeons' and endocrinologists' attitudes towards more aggressive management approach, the frequency of calcium measurement, and investigation and screening for osteoporisis, in the studied region in the years preceding the studied period. Also, before and during the study period, there were no modifications of the operative technique, including introducing minimally invasive parathyroidectomy that may have been more attractive to surgical candidates and referring physicians.

In this study, we examined temporal trends in frequency of a selection of the most common operations in otorhinolaryngology – head and neck surgery. Our finding of variations in utilization of some studied procedures provides a basis for future discussions, research and provision of health care services. Used data are specific to the two studied cantons and do not represent a nationally representative database. The generalisability of the present results to Bosnia and Herzegovina as a whole might be limited. Therefore, similar future investigations conducted in other large hospitals in our country are warranted.

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TRANSPARENCY DECLARATION

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