

BLEEDING AS THE MAIN COMPLICATION AFTER ADENOIDECTOMY AND ADENOTONSILLOTOMY

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Summary

Introduction. Adenoidectomy and adenotonsillotomy are one of the most common surgeries performed in children due to adenoid and tonsils hypertrophy. Although the complications after the surgery are quite rare, one of the most common complication is bleeding.

Aim. The aim of the study was to analyze the rate of bleeding as the most common early complication (within 24 hours) after adenoidectomy and adenotonsillotomy. The assessed factors were: age, sex, type of surgery, frequency of bleeding and applied surgical treatment, as well as coexisting coagulation disorders.

Material and methods. The retrospective analysis of clinical data of 1312 patients hospitalized in the Department of Pediatric Otolaryngology of Medical University of Warsaw between January 2011 and December 2012 who underwent adenoidectomy or adenotonsillotomy was done. The objective of the study was to analyze the rate of bleeding as the most common early complication (within 24 hours) after adenoidectomy and adenotonsillotomy. The assessed factors were: age, sex, type of surgery, frequency of bleeding and applied surgical treatment, coexisting coagulation disorders.

Results. Intense bleeding ($p < 0.01$) and complications requiring surgical treatment ($p < 0.05$) occurred more often after adenotonsillotomy than after adenotomy. In patients with coexisting coagulation disorders early complications were observed more often ($p < 0.01$). Patients from specific age groups did not demonstrate statistically relevant higher complication rate, nor did male versus female group ($p > 0.05$).

Conclusions. The study showed that intense bleeding and complications requiring surgical treatment occurred more often after adenotonsillotomy than after adenotomy. Patients with coagulation disorders were more likely to have intense intra- or post-operatively bleeding. The age and the sex of the patient did not correlate with the higher bleeding rate.

Keywords: adenoidectomy, adenotonsillotomy, complications after adenoidectomy and adenotonsillotomy, bleeding, Bellocq tamponade

INTRODUCTION

Adenoidectomy and adenotonsillotomy are one of the most common surgeries performed by otorhinolaryngologists. Adenoidectomy is the removal of hypertrophied adenoid, whereas tonsillotomy is the partial removal of hypertrophied tonsils with preservation of the tonsillar capsule. Adenoidectomy can be performed alone or with tonsillotomy. The most common indications for adenoidectomy are nasal obstruction, recurrent upper respiratory tract infections, obstructive sleep apnea syndrome, otitis media with effusion or recurrent otitis media. If tonsillar hypertrophy coexists, adenotonsillotomy should be performed. There are various techniques to perform adenoidectomy, among which are curettage, electrocautery or microdebrider dissection. Tonsillotomy techniques may be as following: blunt dissection; guillotine excision; electrocautery or cryosurgery dissection; ultrasonic removal; laser tonsillectomy, along with monopolar and bipolar diathermy dissection (1).

AIM

The aim of the study was to analyze the rate of bleeding as the most common early complication (within 24 hours) after adenoidectomy and adenotonsillotomy. The assessed factors were: age, sex, type of surgery, frequency of bleeding and applied surgical treatment, as well as coexisting coagulation disorders.

MATERIAL AND METHODS

The patients' data were analyzed retrospectively on the basis of medical records of 1312 patients hospitalized in the Department of Pediatric Otolaryngology of Medical University of Warsaw between January 2011 and December 2012 who underwent adenoidectomy and adenotonsillotomy. This study concentrates on the assessment of the frequency and management of intra- and postoperative bleeding as the main occurring complication during adenoidectomy and adenotonsillotomy.

The patients with intense bleeding (> 200 ml) as the main early complication were divided into two groups,

the first group with severe hemorrhage that occurred during surgery or directly afterwards in the operating room (OR) and the second group with bleeding that occurred few minutes or hours after surgery in the recovery room (RR) or in the ward (W).

In the Department of Pediatric Otolaryngology of Medical University of Warsaw adenoidectomy is performed using La Force adenotome. In case of tonsillectomy a tonsillotome is used. Both procedures are performed under general anesthesia with endotracheal intubation. After the removal of adenoid gauze packing is inserted in the nasopharynx for 5 to 10 minutes to achieve hemostasis. For the same reason after tonsillectomy tonsils are pressed with gauze strip or if needed electrocautery is used.

The statistical analysis was done using the PSPPP program. Evaluation of each group was performed with non-parametric χ^2 test. Statistical significance was $p < 0.05$ with limits $0.05 > p > 0.01$. Yates's correction was used in order to prevent overestimation of statistical significance for small data.

RESULTS

The medium age of a female patient was 6 years 2 months, whereas in the male group 5 years 8 months. The age range was from 8 months to 18 years. There was male predominance, $N = 735$ (56%) versus female patients, $N = 577$ (44%), $p > 0.05$ (tab. 1).

In the analyzed group of patients boys accounted for 43.9% and girls for 56.1% in comparison with the whole Polish population where the ratio presents as following 48.7 vs. 51.3% (due to data from Central Statistical Office). There was no statistical difference in more frequent incidence of adenoid and tonsils hypertrophy in males ($p > 0.05$).

Adenoidectomy was performed in 60.1% of cases ($N = 788$) and adenotonsillotomy in 39.9% ($N = 524$).

Myringotomy was performed in 34.5% ($N = 453$) of patients (tab. 2). Other procedures performed simultaneously to adenoidectomy and adenotonsillotomy took place in 19 cases (1.45%): maxillar sinus puncture ($N = 5$), tongue frenuloplasty ($N = 11$), antromastoidectomy ($N = 2$), ciliary biopsy ($N = 2$).

There were 68 patients (5.18%) with coagulation disorders: hemophilia type A – 0.23% ($N = 3$), hemophilia type B – 0.15% ($N = 2$), fibrinogen deficiency – 0.08% ($N = 1$), factor VII deficiency – 0.61% ($N = 8$), factor XI deficiency – 0.08% ($N = 1$), factor XII deficiency – 3.5% ($N = 46$), thrombocytopenia – 0.08% ($N = 1$), von Willebrand disease – 0.8% ($N = 10$), spherocytosis – 0.08% ($N = 1$), unidentified coagulation disorders during diagnostic process – 0.15% ($N = 2$).

Intense bleeding that occurred during the surgery or within 24 hours afterwards was observed in 7.3% of patients ($N = 96$). Profuse bleeding in the operating room was reported in 5.87% of patients ($N = 77$), whereas complications in the postoperative room or ward in 2.9% ($N = 38$) (tab. 3). The management in case of intense blood loss consisted of administration of anti-haemorrhagic drugs and surgical procedures such as prolonged haemostasis, Bellocq tamponade, electrocautery, stitching (tab. 4). Anti-hemorrhagic drugs were administered in 8.6% of cases ($N = 113$). Bellocq tamponade was required in case of 1.2% of patients ($N = 16$). 9 patients (0.69%) needed blood transfusion due to postoperative anemia.

There was no statistically significant difference of the incidence of more complications in the group of patients that had myringotomy ($p > 0.05$).

There were more complications after adenotonsillotomy than after adenoidectomy ($p < 0.01$). In the group of patients after adenotonsillotomy early complications were observed significantly more often in the operat-

Table 1. Age and sex structure of the patients included in the study.

Data	Girls		Boys		P
	N	%	N	%	
Total number of patients:	577	43.9	735	56.1	NS
0-4 y.o.	199	15.2	291	22.2	NS
5-9 y.o.	305	23.2	357	27.2	NS
10-15 y.o.	66	5.0	82	6.25	NS
> 15 y.o.	7	0.5	5	0.4	NS
Adenoidectomy	348	26.5	440	33.5	NS
Adentonsillotomy	229	17.5	295	22.5	NS
Medium age	6 years 2 months old		5 years 8 months old		
The age of the youngest patient	1 year 6 months old		8 months old		
The age of the oldest patient	17 years 2 months old		18 years old		

Table 2. Number of procedures: adenoidectomy, adenotonsillotomy, myringotomy.

Data	Adenoidectomy		Adenotonsillotomy		P
	N	%	N	%	
Myringotomy:	270	20.6	183	14	NS
bilateral myringotomy	241	18.4	162	12.4	NS
left sided myringotomy	14	1.07	7	0.50	NS
wright sided myringotomy	15	1.14	14	1.07	NS
Total number of procedures	788	60.1	524	39.9	NS

Table 3. Intense bleeding rate concerning sex, performed procedure, co-existing coagulation disorders, and age group.

Data	Total number of complications		p	Operating room (OR)		p	In the recovery room (RR) or in the ward (W)		P
	N	%		N	%		N	%	
Girls	51	3.9	NS	40	3.05	NS	25	1.9	< 0.01
Boys	45	3.4	NS	37	2.82	NS	13	0.99	NS
Adenoidectomy	28	2.14	NS	18	1.37	NS	18	1.37	NS
Adenotonsillotomy	68	5.2	< 0.01	59	4.5	< 0.01	20	1.53	NS
Myringotomy	25	1.9	NS	18	1.37	NS	13	0.99	NS
With coagulation disorders	10	0.76	< 0.05	9	0.69	< 0.01	7	0.53	< 0.01
0-4 y.o.	37	2.82	NS	30	2.29	NS	12	0.92	NS
5-9 y.o.	46	3.51	NS	38	2.9	NS	19	1.45	NS
10-15 y.o.	12	0.92	NS	9	0.69	NS	6	0.46	NS
>15 y.o.	1	0.08	-	0	0	-	1	0.08	-
Total	96	7.3		77	5.87		38	2.9	

Table 4. The type of management in case of intense bleeding.

The type of management in case of intense bleeding	Operating room (OR)		In the recovery room (RR) or in the ward (W)	
	N	%	N	%
Suturing	26	1.98	3 (revision of the operative wound)	0.23
Cautery	37	2.82	2	0.15
Belloccq tamponade	6	0.46	10	0.76
Adrenaline with 0.9% NaCl	-	-	13	0.99
Anti-hemorrhagic drugs	79	6.02	34	2.59
Red cells concentrate transfusion (RCCT)	-	-	9	0.69

ing room (OR) than in the recovery room (RR) or in the ward (W) ($p < 0.01$). The results also showed that the bleeding as the early complication ($p < 0.01$) and the surgical management afterwards ($p < 0.05$) were more common after adenotonsillotomy.

There was higher rate of complications in patients with co-existing coagulation disorders ($p < 0.05$). There was no statistically significant difference in the rate of complications concerning sex or any age group: 0-4 years old, 5-9 years old, 10-15 years old and over 15 years old. Although in the group of girls early complications were observed significantly more often in the recovery room (RR) or in the ward (W) ($p < 0.01$).

DISCUSSION

Adenoidectomy is a safe and effective procedure, regardless the method used. It can be performed alone or with tonsillotomy or tonsillectomy. The complications associated with adenoidectomy may be various and may depend on the method of surgery. The use of electrocautery in adenoidectomy can lead to serious neck pain, velopharyngeal insufficiency or nasopharyngeal stenosis, however it is very uncommon (2). Electrocautery increases postoperative pain in comparison with the "cold" dissection and snare technique. On the other hand, the use of the CO₂ laser produces less pain than does electrocautery (3). Patients with overt or submucous cleft palate, orofacial anomalies such as Treacher Collins or Pierre Robin syndromes and neuromuscular disorders are more likely to have velopharyngeal insufficiency (3).

The rate of complications due to adenoidectomy is quite high, but the rate of serious complications is low. Complication rate is estimated of 2-10% and a mortality rate of about 1 in 16 000 (4). There are various early complications reported in the literature. The most common early postoperative complication of adenoidectomy can be fever, sore throat, nausea, vomiting, dehydration, otalgia, fever, dehydration and uvular edema (3-5). Less common complications include atlantoaxial subluxation, mandible condyle fracture, infection, Eustachian tube injury, intraoperative vascular injury, subcutaneous emphysema, mediastinitis, Eagle syndrome, cervical osteomyelitis, and taste disorders (3, 6). Postoperative hemorrhage is recognized as the most serious complication after adenoidectomy and adenotonsillectomy, in most patients occurring within 24 hours after the surgery, however, it can occur at any time after it, often 7 and 10 day post-operatively (7).

According to some studies, the risk of postoperative complications is higher during adenotonsillectomy and blood loss during adenoidectomy is greater with increasing age, however the size or quality of adenoid is not associated with blood loss. Hannu et al. present that adenoidectomy performed simultaneously with tonsillectomy is associated with higher intraoperative blood

loss, especially in older children, over 10 years old (8). In the literature the highest incidence of hemorrhage was found in patients over 16 years of age (2.19%) (9). On the other hand, some authors state that higher incidence of complications can be found in children younger than 3 years old, specifically, children aged 1-2 years old with a history of gastroesophageal disease, prematurity, and/or cardiovascular malformations (3, 4). Arnoldner et al. have reported that male patients had a 58% – higher risk of hemorrhage than female patients (9). Our study shows that the bleeding is more common after adenotonsillectomy, however, there is no correlation between higher rate of peri- and postoperative bleeding and the age or sex of the patient. Our study did not cover the assessment of the size of adenoid and tonsils and the risk of bleeding.

The estimated blood loss during the surgery can vary due to the technique, for example Clemens et al. proved that blood loss was lower in patients after electrocautery ablation versus curettage adenoidectomy (10). The rate of hemorrhage is different according to different authors – 1.5% (11). Prevalence of hemorrhage with adenotonsillar surgery is reported as occurring from 0.1 to 8.1%, depending on its severity (3). Some studies have demonstrated that rates of the hemorrhage after tonsillectomy in children range from 3 to 7% (12), whereas the others revealed that only 0.4% patients had hemorrhage necessitating return to the operating room, all following tonsillectomy (13). In our research 7.3% of patients had intense bleeding after adenoidectomy or adenotonsillotomy.

In some cases of severe hemorrhage during adenotonsillar surgery blood transfusion is required, estimated at 0.04% (3). In our study material the necessity of blood transfusion was present in 9 patients (0.69%).

There is no consensus in the literature over the necessity of preoperative coagulation tests (3, 12, 14, 15). Naren et al. did not reveal an increased risk of postoperative bleeding in children with hematologic disorders undergoing adenoidectomy (12). In our study there were 68 patients (5.18%) with coagulation disorders, and the analysis showed a higher risk of bleeding in that group of patients. In the Department of Pediatric Otolaryngology of Medical University of Warsaw patients with abnormal coagulation test results are consulted by hematologist. There are patients who are diagnosed with coagulation disorders previous to the surgery, thanks to the additional diagnostic coagulation tests. Thus, the authors of this study believe that the standard coagulation tests, such as CBC, prothrombin time (PT) and partial thromboplastin time (PTT) should be performed on basis routine.

CONCLUSIONS

The study shows that even though adenoidectomy and adenotonsillotomy are one of the most common

procedures in otorhinolaryngology, still the surgeon has to be aware of the risk of severe bleeding, especially concerning adenotonsillotomy. The authors believe, that the adequate instruments can reduce the risk of bleeding. However, patients with coagulation disorders are more susceptible to have intense bleeding intra- or postoperatively. The age of the patient, nor the sex do not correlate with the higher rate of bleeding.

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