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ORIGINAL PAPER

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# INFLUENCE OF OVERWEIGHT AND OBESITY IN CHILDREN ON ANESTHESIOLOGICAL COMPLICATIONS APPEARANCE DURING ADENOIDECTOMY AND ADENOTONSILLECTOMY

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## ABSTRACT

**Introduction:** Obesity in children is becoming from year to year enormous medical and socio-epidemiological problem according to increasing number of overweight and obese children. Overweight and obesity in children mostly affects on cardiovascular, respiratory and endocrine system disturbances. Adenoidectomy and adenotonsillectomy belong to group of most often done operation in children population. Anesthesiology complications during adenodecotomy and adenotonsillectomy in children are known as very disturbing and dramatic. **Methods:** Retrospective-prospective study includes 162 children, both genders, 3 to 12 years old, who are hospitalized and operated (adenoidectomies and adenotonsillectomies) on Otorihinolaryngologic clinic of University clinical centre Tuzla in the four year period. Purpose of the study is to show the influence of overweight in children on appearance of anesthesiology complications such as difficult intubation, bronchospasm and laryngospasm. Body mass index (BMI), which is used as universal measure, is adapted with gender specific scales of National statistic centre of United States of America. All children with BMI over 25 are referred as overweight and those over 30 as obese. These children categories were compared to those with normal BMI according to anesthesiology complications incidence. **Results:** Overweight in operated children is noticed in 21%, and 11% of children was obese and there wasn't distinction between boys and girls. Anesthesiology complications are evaluated in 12 of them (7.4%). Total analyzed sample show significant connection and influence of overweight with appearance of anesthesiology complications. Separate comparison for two types of operations is indicating that during adenoidectomies there hasn't been noticed connection between overweight and anestehesiological complications, while in case of adenotonsillectomies direct and significant correlation is proven. **Conclusions:** According to increased risk of anesthesiology complications in overweight and obese children during adenodectomies and adenotonsillectomies it is important for anesthesiologists to do much serious preoperative evaluation of obese children, and to be more prepared for every of possible unwished supsize during perioperative period.

**Key words:** children, overweight, obesity, adenoidectomy, anesthesiology complications.

## 1. INTRODUCTION

Obesity in children is becoming one of a huge world's health and socioeconomic problems. Body mass index in children is counted on the same way as in adults but must be compared to the child population of the same sex and age. Children with BMI over 85 percentile belong to a group of overweight and those over 95 percentile are obese (1). It is estimated that 10% of world children populations have obesity problems and the numbers are continuously increas-

ing especially during last three decades (2). Genetic factors of child obesity lost it's importance comparing to factors as nutrition, exercise practicing and so on. Child obesity is seen more often in poor families than in those with good socioeconomic situation. Only 5% of child obesity is affected by some another decease (3). Adenotonsillectomy and adenoidectomy are the most often surgical intervention in children (4). Generally considered these operations belong to group of relatively safe procedures where patients death

is registered on every 16000- 35000 patients . Anesthesiology complications are not so frequent but could be life threatening. The most often anesthesiology complications during adenotonsillectomy and adenoidectomy are multiple laryngoscopy attempts, affected mask ventilations, upper respiratory system obstruction (5). Laryngospasm is the most often and most dangerous anesthesiology complication which appears after patient extubation, while during „shallow“ anesthesia bronchospasm is possible. Postoperative nausea and vomiting are noticed often after adenotonsillectomy with incidence over 70% (6). Approximately 1-2% of patients which are operated in general anesthesia are obese and 13-20% of them develop cardiorespiratory complications with high risk of acute pulmonary embolism (7). Obesity and obstructive sleep apnea represent independent predictors for perioperative respiratory complications in children. Overweight in children increase incidence of difficult mask ventilation, respiratory obstruction, bronchospasm and another respiratory incidents. (8). Most important predictors for postsurgical respiratory morbidity in children are younger children population, obesity and obstructive sleep apnea (9).

**2. PATIENTS AND METHODS**

Study is retrospective-prospective analysis of 162 children, both genders and 3-11 years old, who are hospitalized and operated (adenotonsillectomies and adenoidectomies) on Otorhinolaryngology clinic of University clinical centre Tuzla in the period of 4 years. Children are divided in two groups according to the type of surgery and there was 100 children with adenotonsillectomy and 62 with adenoidectomy. All children according to anesthesiology criteria belonged to ASA I and ASA II groups. There was counted body mass index for every child preoperatively on the base of measured weight and height and after they have been divided in two groups of normal and overweight. Both groups further are divided by gender. Anesthesiology complications which have been noticed during intubation, operative period, and extubation were difficult intubation, upper respiratory obstruction (laryngospasm and bronchospasm).

Adenotonsillectomies and adenoidectomies are done with standard operative technique and anesthesia was led by experienced anesthesiologist. Every patient had its own protocol with all necessary data who have been processed with standard methods of descriptive statistics (central tendency measures, dispersion measures) and statistical significance testing (X2-test, student’s t-test, Mann Whitney test).

**3. RESULTS**

There has been analyzed 162 patients. Adenotonsillectomy have been done in 100 patients (61,7%) while adenoidectomy in 62 patients (38,3%). Average patients age was 6,95 years (3-11.9 years). According to its gender there was 100 males and 62 females operated on and comparison have been made between two groups for both operations (Figure 1).

Measuring body mass index (BMI) for every patients there have been created BMI categories (Figure 2). Patients mostly had normal BMI.

Table 1 shows distinction between BMI groups according to gender and figure 3 according to the type of opera-

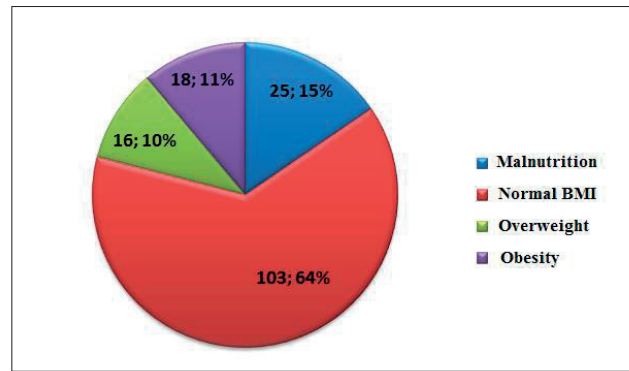


Figure 1. Gender structure of operated patients

|                |         | BMI categories |            |           |         |
|----------------|---------|----------------|------------|-----------|---------|
|                |         | Malnutrition   | Normal BMI | Overweig. | Obesity |
| Patient gender | M       | N 15           | 65         | 9         | 11      |
|                |         | % 60.0%        | 63.1%      | 56.3%     | 61.1%   |
| F              | N 10    | 38             | 7          | 7         |         |
|                | % 40.0% | 36.9%          | 43.8%      | 38.9%     |         |

Table 1. BMI groups of operated patients

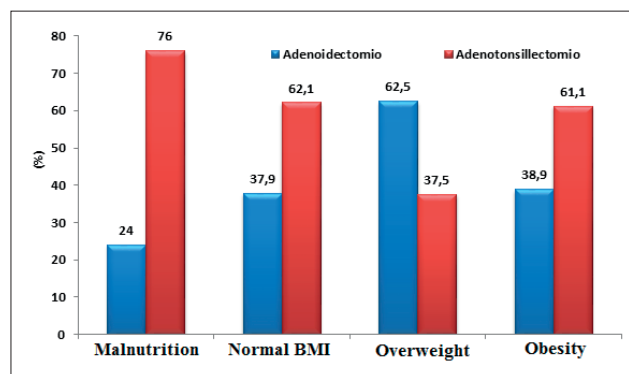


Figure 2. Patients BMI categories

|                           | Number | Percent. |
|---------------------------|--------|----------|
| Without complications     | 150    | 92.6     |
| Bronchospasm              | 6      | 3.7      |
| Laryngospasm (extubation) | 4      | 2.5      |
| Bronchospasm (extubation) | 1      | .6       |
| Difficult intubation      | 1      | .6       |
| Total                     | 162    | 100.0    |

Table 2. Types of anesthesiologic complications

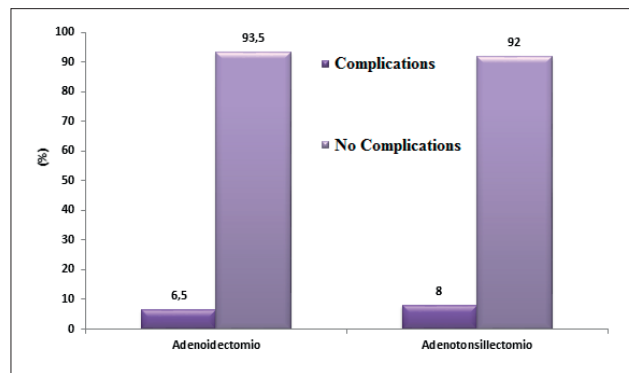


Figure 3. BMI categories for adenoidectomies and adenotonsillectomies

tion. There was not statistically significant distinction in incidence between two categories (X<sup>2</sup>=6,14; df=3; p=0.11).

Anesthesiology complications have been noticed in 12

| Operation type      | Presence of complications | BMI categories |            |          |         | Total  |       |
|---------------------|---------------------------|----------------|------------|----------|---------|--------|-------|
|                     |                           | Malnutrition   | Normal BMI | Overwei. | Obesity |        |       |
| Adenoidektomio      | YES                       | N              | 0          | 4        | 0       | 4      |       |
|                     |                           | %              | .0%        | 10.3%    | .0%     | .0%    | 6.5%  |
|                     | NO                        | N              | 6          | 35       | 10      | 7      | 58    |
|                     |                           | %              | 100.0%     | 89.7%    | 100.0%  | 100.0% | 93.5% |
| Adenotonsillektomio | YES                       | N              | 1          | 2        | 1       | 4      | 8     |
|                     |                           | %              | 5.3%       | 3.1%     | 16.7%   | 36.4%  | 8.0%  |
|                     | NO                        | N              | 18         | 62       | 5       | 7      | 92    |
|                     |                           | %              | 94.7%      | 96.9%    | 83.3%   | 63.6%  | 92.0% |

Table 3. Incidence of anesthesiologic complications for all BMI categories

patients (7,4%) and it's incidence for both types of operations has been measured (figure 4). There was not statically significant distinction between two types of operations ( $\chi^2=0,003$ ;  $df=1$ ;  $p=0,95$ )

The most often anesthesiology complication was bronchospasm while laryngospasm during extubation and difficult intubation were noticed once (Table 2)

Comparing BMI categories of patients with incidence of anesthesiology complications for both types of operations there was noticed positive and significant correlation during adenotonsillektomy while it was not case during adenoidektomy (table 3). Obese patients who are planned for adenotonsillektomy have 12,14 times bigger chance for anesthesiology complications

Using Spearman's nonparametric correlation it is evident, there is smooth, positive and significant correlation between BMI and presence of complications.

#### 4. DISCUSSION

Adenoidektomies et adenotonsillektomies as the most frequent operations in childhood have been researched for so many times and from different angles (10). Nafiu in it's similar study in 2007 have shown that average patients age was 7,2 (+/-3,8) (11). Children who were adenoidektomised and adenotonsillektomised have prevalence of overweight and obesity in the study realized in 2009, by Costa and Mitchel while children with normal BMI were dominant in this study (12). Too, Conlon in his study in 1997 indicates that children who are planned for adenoidektomy et adenotonsillektomy from year to year show increase in its BMI (13). From the other side 2170 children in United states of America who have had these two types of operations shown 10% lower BMI comparing with healthy populations of children with same age (14). This study indicates direct and significant connection between obesity in children and incidence of anesthesiology complications during adenotonsillektomy, and with similar results Drake-Lee and Stokes in 1998 propose that adenoidektomy as surgery with a rare anesthesiology complications could be done as daily surgery while it was not case with adenotonsillektomy which is mentioned as potentially very dangerous (15). Analyzing 413 children with the same operations as in this study Kendrick and Gibbin brought the number of 5,6% patients with anesthesiology complications which is little lower comparing with this studies (7,6% patients) (16). Most of the children in this study didn't have any complication. Two or more anesthesiology complications were noticed in one patient. In the other studies risk factor for anesthesiology complications was from 4-13 while in this study it was 12,14.

#### 5. CONCLUSIONS

Adenoidektomy and adenotonsillektomy are the most often operations in children. 21% of children who were operated by one of these two methods are obese. Obesity in children comparing to all others comorbidities has shown as dominant. This study unveiled that 15% of examined children had malnutrition. BMI in children with adenotonsillektomy is bigger than in those with adenoidektomy. It was shown that obesity in children doesn't influence longer postoperative hospitalization for both types of operations. Complication incidence during adenoidektomy and adenotonsillektomy was 7,6% and is lightly bigger than in same other similar studies. Bronchospasm was the most often complication (3,7%) and is followed by extubation laryngospasm (2,5%) and difficult intubation (0,6%). Obese children show much more anesthesiology complications comparing to children with normal body weight and risk factors indicates 12 times higher chance for complications in obese children comparing to normal BMI categories. Genders didn't show any significance in anesthesiology complication incidence. All these data form general conclusion that every anesthesiologist should be very careful and well prepared for all operations done on obese children.

CONFLICT OF INTEREST: NONE DECLARED.

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