The main aim of this study was to analyse risk factors of postoperative morbidity after extended laryngeal surgery comparing patients with diabetes mellitus and non-diabetic patients. In retrospective study 69 patients (63 male and 6 female), who underwent partial laryngopharyngectomy and total laryngectomy between 2003 and 2004, were evaluated. 13% of the total group of examined patients had concurrent diabetes, while 87% were non-diabetic patients. We performed partial laryngopharyngectomy in 39 out of 69 patients (56.5%) and total laryngectomy in 30 patients (43.5%). Secondary wound infections (88.9%) and pharyngocutaneous fistula (44.5%) had a significantly higher rate in diabetic patients (p<0.001). Among diabetics the cases with intraoperative or postoperative blood transfusions were more frequent – 44.4% (p<0.001). Among diabetics the cases with intraoperative or postoperative blood transfusions were more frequent – 44.4% (p<0.001). Diabetic patients with laryngectomy procedures had more frequently prolonged postoperative anemia (55.5%, p<0.001) and electrolytic disbalance (66.6%, p<0.001). Our results have confirmed that diabetes mellitus is an important independent general clinical factor, which increases postoperative morbidity and hospitalization time in laryngeal surgery. Our data indicate the need to make a very serious plan and clinical assessment for laryngeal surgical therapy in diabetic patients.

Key words: diabetes mellitus, laryngeal surgery, complications

INTRODUCTION

The incidence of complications after laryngeal surgery are very common and they have great implications on postoperative patient morbidity and also contribute to prolonged hospital stay. The most common complications are the development of different types of infections, the occurrence of a pharyngocutaneous fistula and postoperative hemorrhage. There is still a disagreement about significant clinical factors which may lead to the appearance of pharyngocutaneous fistula after laryngectomy. Some authors consider that there are no clinical factors which might be connected with fistula formation. Others divide all suggested risk factors into two groups: 1. general (accompanying or concurrent with the diseases such as diabetes mellitus, liver diseases or chronic anemia and 2. local (preoperative radiotherapy preceding early surgery, prior tracheotomy, extension and type of primary tumor resection and regional neck metastases, the fashion of pharynx closure etc.)

In addition, data on intraoperative and postoperative blood transfusion for incidence of pharyngocutaneous fistula and wound infections are still contradictory. These parameters might be very important for laryngeal surgery, or on the contrary, induced posttransfusion immunosupression might not contribute to secondary infection. The purpose of this paper is to analyse risk factors of postoperative morbidity after laryngeal surgery, comparing the patients with diabetes mellitus and operated non-diabetic patients.

MATERIAL AND METHODS

In retrospective study we evaluated 69 patients (63 male and 6 female) who underwent laryngectomy procedures from January 2003 to January 2004. The average age was 60, with range of 37 to 79. 9 out of 69 examined patients (13%) were those with concurrent diabetes, while 60 out of 69 (87%) were non-diabetic patients. The patients with total pharyngolaryngectomy and those who had been previously surgically treated or radiated were excluded. Detailed lists of risk factors including age, sex, family history, habits (excessive alcohol and tobacco intake), associated systemic diseases, tumor localisation, stage and grading of disease, preoperative antibiotic therapy, status of tumor margins, blood transfusions, nasogastric feeding tube, secondary wound infections, occurrence of pharyngocutaneous fistula, duration of hospital stay, laboratory blood and
urine analyses were reviewed. Patients from both groups underwent the same standard T-type technique of pharyngeal closure with an absorbable single suture. Broad-spectrum antibiotic prophylaxis was administered to all these patients the day before surgery following a single intraoperative dose for at least a week in the postoperative period. In all cases bilateral neck vacuum drainage system of the cervical spaces has been removed on 4th postoperative day and oral feeding was initiated after removing nasogastric tube 8 days after surgery. Preoperative hematologic values and the nutritional status of the patients were considered to be within normal limits. The Student T-test and χ² test have been used in the statistical analysis in order to demonstrate significant factors contributing to fistula formation and infections.

RESULTS

We performed partial laryngopharyngectomy in 39 out of 69 patients (56.5%) and total laryngectomy in 30 patients (43.5%). The patients who had been surgically treated were mostly in the advanced stage of the clinical tumor disease: stage I – 9 (13%), stage II – 32 (46.4%) and stage III – 28 (40.6%). Concurrent modified neck dissection was performed in 63 patients (91.3%). The overall complications (secondary wound infections, hemorrhage, pharyngocutaneous fistula, pneumonia, cutaneous emphysema and chyle fistula) rate was 47.8%. Secondary wound infections in 31 cases (44.9%) and the appearance of pharyngocutaneous fistula in 6 cases (8.7%) were the most common postoperative complications. We observed considerable differences between diabetic and non-diabetic patients. The secondary wound infection occurred in 8 diabetic patients (88.9%) and the fistula rate was 44.5% in the same group. (Table 1.) The average time of a fistula occurrence was 6 days. What we got were statistically significant differences (p< 0.001) in the frequency of secondary wound infection and the occurrence of fistula in diabetic patients compared to our healthy (non-diabetic) patients. The glucose levels in blood ranged between 7.7 and 28.7 mmol/L (the mean value 15.2 mmol/L). The gram-positive stained microorganisms were the cause of infection in one half of diabetics, while in non-diabetics it was observed that 43.4% were infected by gram-negative stained microorganisms. (Figure 1.) Infections caused by certain microorganisms (Staphylococcus aureus, gram-positive organisms) occurred with increased frequency (43.7%). Four (4) diabetic patients (44.4%) were given blood transfusion after surgery, while in 5 patients (55.5%) the diagnosis of postoperative anemia with decreased hemoglobin (Hb) value was established. 6 patients out of 9 (66.6%) had electrolytic disbalance in the first three days. (Table 2.) For the frequency of blood substitution, the appearance of postoperative anemia and electrolytic disbalance, we got values which show significant statistical differences between the observed two groups (p<0.001). The average duration of a hospital stay for patients with diabetes was 44 days, versus 24 days in non-diabetic patients, but this difference was not statistically significant. All patients were discharged only after their complications had been completely resolved. In 4 patients with pharyngocutaneous fistula (4/6 or 66.6%), two from the diabetic group (22.2%) and two from the non-diabetic (3.3%) group, the fistulas resolved spontaneously with meticulous local wound care. The final results were achieved with the adequate choice of systemic antibiotics, irrigation with Rivanol® antiseptic solution and topical applying of gauze strips soaked in iodine solution mixed with boracic acid powder into the fistula cavity. However, in the remaining 2 patients with fistula formation (33.3%), both of whom were diabetics, surgical closure was required. In one of them repair was performed with a pectoralis major miocutaneous flap, while in the other it was successfully reconstructed with the sliding flap of a sternooceolod muscle. All other examined clinical factors were not statistically significant.

DISCUSSION

Diabetes was already confirmed as a risk factor for the appearance of wound infections and developing a pharyngocutaneous fistula in laryngeal surgery. Dedo et al. suggested that systemic diseases could contribute to the formation of a fistula. Furthermore, according to medical sources, a pharyngocutaneous fistula is the most common postoperative complication after total laryngectomy. A relatively high level of frequency of secondary infections could be expected because we were taking a smear of the wound and paratracheostomal regions several times after surgery. The occurrence of prolonged bleeding, discharging from suture line or excess fluid in the cervical spaces, odor and edema of the skin could be alert signs of infections. However, the situation is sometimes quite the opposite and the fistula may lead to the development of infections. The occurrence of fever that persisted for more than 4 days after the initiation of antibiotic therapy was not always the sign of local complications, but when it was associated with intensive cough, it required pulmonary status and chest radiography. Our patients with diabetes seemed to be at a particularly high risk of Staphylococcal infections. Wound infection is usually the result of contamination from the nose, pharynx or bronchi. Slightly higher...
incidence of Staph. pneumonia, which is usually the most frequent medical complication in diabetic persons, could be explained by positive nasal carriage of Staph. aureus in this group of patients. Because of the above mentioned complications, we recommended immediate physical activity to operated diabetic patients with the history of excessive alcohol and tobacco intake. It is an interesting fact that although both diabetics and non-diabetics were receiving relatively long courses of antibiotics, we did not have increased incidence of candida infections or local candidiasis, so we do not recommend antifungal drugs as first-line therapy in diabetic patients. From our case records there is no doubt that diabetes is a risk factor for postoperative complications in radical laryngeal surgery. However, the increase or peak glucose levels and the appearance of glucose in urine per se were not directly related to the appearance of local complications. Anyhow, blood glucose levels should be closely monitored because early stabilisation of this value is necessary in order to shorten postoperative care. In such cases major metabolic changes and decreased immunity may probably have negative influence on the duration of wound healing. In a previous randomized, controlled study conducted in a surgical intensive care units (ICU), strict control of blood glucose levels with insulin reduced morbidity and mortality. 18 Neither in diabetics nor in non-diabetics the placement of nasogastric feeding tube was a risk factor, not even in patients with regurgitation problems. We consider these conditions only temporary reactions of intolerance to a new diet regime. Continuous postoperative antireflux therapy, adequate postoperative nutritional support with intake of all essential elements and liquids, and delay of oral feeding in patients who already developed fistulas, are our routinely accepted practice to avoid further morbidity. On the other hand, it is important to prevent the possibility of later local damage or ulcer on nasal mucosa that might appear as a consequence of prolonged implantation of tube and consequently to avoid further spreading of the nasal Staph. infection. Some authors mentioned that intraoperative or other transfusions are predisposing factors for fistula formation19. Hier et al.20 reported a 28% rate in patients who received at least one unit of blood during transfusion, compared with a rate of only 7% in those who did not. In contrast, others found no correlation between transfusion and recurrence or complications from infections21. Our data indicate the relevance of intraoperative or postoperative blood transfusions in affecting the wound infection rate in diabetic patients. Although we were giving blood transfusion during or after laryngectomy surgery in 14 out of 69 patients (20.3%), we suggested avoiding it whenever it is possible and consequently decreasing all blood requirements. One of the reasons for this attempt might be an interesting relationship between low Hb values during the immediate postoperative period and high incidence of fistula formation22,23. It remains uncertain whether low Hb values also result from decreased nutritional intake or vice-versa. Prolonged bleeding usually occurred with extensive primary tumor resection particularly in more invasive neck surgery or in bilateral neck dissections. Decreased Hb and electrolytic values of metabolic disbalance are more likely to appear in greater locoregional tissue damage and could be influenced by general medical status in diabetes. If methods to avoid transfusions or reduce the acute risks of withholding transfusion surface, then these differences in occurrence of infections gain importance24. Obviously, if mere fluid replacement is adequate, transfusion should be avoided. Autologous blood is an option, particularly in elective surgical cases. It is often

<table>
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<tr>
<th>TABLE 1</th>
<th>SIGNIFICANT DIFFERENCE IN APPEARANCE OF POSTOPERATIVE COMPLICATIONS</th>
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<tbody>
<tr>
<td></td>
<td>Secondary wound infection</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Diabetic patients</td>
<td>8</td>
</tr>
<tr>
<td>Non-diabetic patients</td>
<td>23</td>
</tr>
<tr>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
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<tr>
<th>TABLE 2</th>
<th>SIGNIFICANT DIFFERENCE FOR THE FREQUENCY OF BLOOD TRANSFUSION APPEARANCE OF ANEMIA AND ELECTROLYTIC DISBALANCE AFTER SURGERY</th>
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<tbody>
<tr>
<td></td>
<td>Blood transfusion</td>
</tr>
<tr>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Diabetic patients</td>
<td>4</td>
</tr>
<tr>
<td>Non-diabetic patients</td>
<td>10</td>
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<tr>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
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unfortunately of limited use in oncology patients because of time constraints and sometimes low baseline hemoglobin levels. Emerging technologies such as artificial hemoglobin hold great promise not only in avoiding infection risks but also presumably in terms of lack of immune suppression and increased disease-free survival. Because of all these hematologic and metabolic disturbances associated with diabetes, we advise the most simple and most reliable reconstructive pharynx technique to be done, which is not harmful for the already decreased capacity of an organism to recuperate.

CONCLUSIONS

Our data confirmed an increased risk of secondary wound infections and occurrence of pharyngocutaneous fistula in diabetic patients who underwent partial laryngo-pharyngectomy and total laryngectomy procedures. Furthermore, more frequent blood transfusions need to be implemented among diabetic patients undergoing laryngeal surgery. These blood transfusions lead more frequently to early postoperative anemia and electrolyte disbalance. Diabetes mellitus is an independent general clinical factor which could cause prolonged hospitalisation and increased postoperative morbidity. Therefore, a serious treatment plan and approach in the surgical treatment of this category of patients should be made.

SUMMARY

Glavni cilj ovog rada je da analizira faktore rizika za pojavu postoperativnog morbiditeta posle proširene hiruršije larinksa uporedjivanjem bolesnika sa dijabetesem mitusom i nedijabetičara. U retrospektivnoj seriji analizirano je 69 (63 muškarca i 6 žena) bolesnika kod kojih su učinjene parcialna laringo-faringektomiija i totalna laringektomiija u periodu od 2003. do 2004. godine. Od ukupno ispitivanih sa udruženim dijabetesom je 13,0% a nedijabetičara 87,0%. Kod 39/69 (56,5%) uradjena je parcialna laringo-faringektomiija, a kod 30 (43,5%) totalna laringektomiija. Sekundarna infekcija rane (88,9%) i faringokutana fistula (44,5%) su značajno češće bile u dijabetičara (p<0.001). Među dijabetičarima intraoperativna ili postoperativna transfuzija krvi je zabeležena značajno češće (p<0.001). Laringektomisani bolesnici sa dijabetesem mitusom imaju češće produženu postoperativnu anemiju (55,5%, p<0.001) i elektrolitni dizbalans (66,6%, p<0.001). Naši rezultati potvrđuju da je dijabetes melitus važan nezavisni optiklinički faktor koji povećava postoperativni morbiditet i vreme hospitalizacije kod larinkške hiruršije. Naši podaci ukazuju na potrebu stvaranja veoma ozbiljnog plana i kliničkog pristupa u hirurškom lečenju larinksa kod dijabetičkih bolesnika.

Kjućne reči: diabetes mellitus, larinkšna hiruršija, komplikacije

REFERENCES


