Rhinology, 41, 76-79, 2003

Bacteriemia in septoplasty and septorhinoplasty surgery*

İrfan Kaygusuz[1], Ahmet Kizirgil[2], Turgut Karlidağ[1], Şinasi Yalçin[1], Erol Keleş[1], Yusuf Yakupoğullari[2], Cengiz Alpay[1]

[1] Department of Otorhinolaryngology, Fırat University Medical Faculty, Elazığ, Turkey
[2] Department of Microbiology and Clinical Microbiology, Fırat University Medical Faculty, Elazığ, Turkey

SUMMARY

This study was conducted in an attempt to investigate whether bacteriemia developed in patients with septoplasty and septorhinoplasty in the postoperative period during which an anterior nasal pack was in their nose. Fifty-three patients who went through septoplasty or septorhinoplasty operations were followed in this study. Nasal smear cultures were obtained from all the subjects before the operation. After the packs were retrieved, smears were also obtained from the pack material. Venous blood samples were obtained from the patients immediately before the operation, after the operation and immediately following the retrieval of the pack. When preoperative nasal smear cultures and postoperative pack material cultures of the patients that were obtained at 48 hours were compared, it was seen that different micro-organisms were present in 66% of the patients. Bacterial growth was not observed in any of the preoperative blood cultures; whereas 8 patients (15.0%) had bacteriemia in the blood samples obtained immediately after the operation and 9 (16.9%) had growth in the blood samples obtained following the retrieval of the pack. With these results we have seen that bacteriemia can develop in patients with septoplasty and septorhinoplasty. It did not cause serious clinical problems. However, in patients with cardiovascular problems, this possibility should be taken into consideration and relevant preoperative precautions should be implemented.

Key words: septoplasty, septorhinoplasty, bacteriemia, nasal pack

INTRODUCTION

Septum surgery started in the 19th century with the excision of septal pathologies together with the septum mucosa. With the advent of submucous resection in the beginning of the 20th century, it showed significant developments and reached the level it has today with the implementation of septoplasty procedures (Sessions, 1984). Nasal septal surgery is a frequently used procedure in ENT and head and neck surgery. Sometimes, septoplasty or septorhinoplasty are insufficient individually to achieve nasal reconstruction. In such instances co-utilisation of these two surgical techniques is a common approach.

Nasal packs are utilised nearly by all ENT surgeons following septoplasty or septorhinoplasty procedures. Nasal packs prevent postoperative septal hematoma while providing nasal support (Illum et al., 1992).

Infections are rarely encountered following septoplasty or septorhinoplasty (Slavin et al., 1983). However, we know that endoscopic examinations of the upper and lower gastrointestinal system, nasotracheal intubation, tonsillectomy, dental and urological surgical interventions provocate the development of bacteriemia (Glancy et al., 1985; Goldman et al., 1985, Kaygusuz et al., 2001). Serious complications such as a toxic shock syndrome, staphylococcal endocarditis, meningitis and pseudomonas infections have been reported due to nasal surgery or due to the nasal packs that are placed following the surgery (Teichgraeber et al., 1993; Leonard et al., 1998).

This study was conducted with the aim of investigating whether bacteriemia developed due to septoplasty and septorhinoplasty operations or due to the nasal packs that are placed during the postoperative period.

MATERIAL AND METHODS

Fifty-three patients (35 males, 18 females) between the ages of 18-50 (mean age 27.0±8.5) who were operated with the indications of septoplasty or septorhinoplasty in Fırat University, Fırat Medical Centre, Department of ENT from June 2001 to January 2002 were recruited in the study. The patients who have utilised antibiotics in the preoperative period or the ones who had nasal discharge and hyperaemia in the preoperative nasal examination were not included in the study. The same surgeons, under general anaesthesia in operation room condi-

* Received for publication: July 19, 2002; accepted November 22, 2002

tions carried out the operations. Thirty patients had septoplasty and 23 patients had septorhinoplasty. Turbinate surgery was not applied to any of the patients. The nasal passage was washed with a 0.9% sodiumchloride solution before and after the operation. After the operation, anterior nasal packs with the same features and not containing topical antibiotics (Ivalon Surgical Products, REF Q770410, USA) were placed into nasal passage of all patients. The antibiotic treatment was applied to the patients in the preoperative and postoperative periods. The skin of the nasal vestibule was disinfected with a 0.5% alcohol hexidine solution. In order to prevent additional contaminations, the vestibulum nasi was opened by using a sterile speculum. Smear cultures were obtained from the noses of all the patients before and after the operation and from the pack material after its retrieval by using cotton tipped swabs. All the obtained samples were transferred to the microbiology laboratory within half an hour. Smear samples were incubated in blood agar and EMB agar culture plates at 37°C for 16-24 hours. The micro-organisms that grew during the incubation period were identified with traditional methods.

Ten ml of venous blood sample was obtained from the patients immediately before the operation, after the operation and at the time of pack retrieval (postoperative 48 hours). Blood samples were divided into two aliquots and were transferred to liquid culture bottles containing specific media for aerobic and anaerobic micro-organisms. These samples were evaluated with BacT/Alert (Organon Tekniko Corp, NC 27704, USA) automated blood culture system.

RESULTS

From the patients, 183 aerobic bacteria were isolated from postoperative nasal smear cultures and 145 from nasal packs that were retrieved 48 hours postoperative. The most commonly isolated strain was Coagulase (+) *staphylococcus* for both of the sample types (Table 1).

From six of the smear cultures that were obtained from the right nasal passage and four of the smear cultures that were obtained from the left nasal passage no micro-organisms were isolated.

The micro-organisms that were isolated from the nasal packs that were retrieved 48 hours after the operation were similar to those of the preoperative nasal flora in 18 (33.9%) patients and were different in 35 (66.0%) patients. In 35 patients who had different micro-organisms, nasal flora harboured additional micro-organisms to those that were isolated from the nasal packs, whereas in 23 patients' nasal packs and preoperative flora had completely similar bacterial contents.

In 18 (18.7%) of the smear cultures that were obtained from the nasal passage (right and left), a single micro-organism was isolated, however in 68 smears (70.8%) polymicro-organisms dominated the culture environment. In nasal pack smear cultures (right and left), 46 (47.4%) had single micro-organisms and 51 (52.5%) had poly micro-organisms.

No micro-organisms were isolated from any of the blood cultures that were obtained in the preoperative period. However, in the blood cultures obtained immediately after the operation, 5 patients with septoplasty and 3 patients with septorhinoplasty had bacterial growth. These bacteria were similar with that of the preoperative nasal smear cultures and postoperative nasal pack cultures in 7 patients and was different in one patient. In the blood cultures that were obtained at 48 hours after the operation while retrieving the nasal pack, 3 patients with septoplasty and 6 patients with septorhinoplasty had bacterial growth. These bacteria were similar to those that were found in nasal smear cultures and postoperative nasal pack smear cultures in 7 patients and was different in 2 patients. Anaerobic *peptostreptococci* and *Candida* spp. were isolated from these two patients respectively (Table 2).

DISCUSSION

Bacteriemia is one of the most important complications that might arise in the postoperative period. However, the risk of bacteriemia might differ according to the type of the surgical procedure that is carried out. It is considered that postopera-

Table 1. The microorganisms that were isolated from preoperative nasal flora and postoperative nasal pack smear cultures.

	Preoperative nasal flora		**Postoperative nasal pack**	
Microorganisms	**Right**	**Left**	**Right**	**Left**
Coagulase (+) *staphylococci*	33 (37.4 %)	32 (34.4 %)	28 (38.3 %)	29 (40.2 %)
Neisseria spp.	21 (23.3 %)	24 (25.8 %)	3 (4.1 %)	3 (4.1 %)
Coagulase (-) *staphylococci*	19 (21.1 %)	19 (20.4 %)	3 (4.1 %)	3 (4.1 %)
Streptococcus spp.	9 (10.0 %)	10 (9.3 %)	2 (2.7 %)	2 (2.7 %)
Diphtheroid spp.	4 (4.4 %)	3 (3.2 %)	1 (1.3 %)	1 (1.3 %)
Klebsiella spp	1 (1.1 %)	2 (2.1 %)	21 (28.7 %)	18 (25.0 %)
Haemophilius spp.	1 (1.1 %)	1 (1.0)	-	-
Pseudomonas aeruginosa	1 (1.1 %)	-	2 (2.7 %)	4 (5.5 %)
Candida spp	1 (1.1 %)	2 (2.1 %)	-	-
Acinobacter spp.	-	-	1 (1.3 %)	2 (2.7 %)
Escherichia coli	-	-	4 (5.4 %)	4 (5.5 %)
Total	90 (100 %)	93 (100 %)	73 (100 %)	72 (100 %)

Table 2. The distribution of the microorganisms that were isolated in postoperative blood cultures.

		Blood Cultures	
		The number of bacteria cultured immediatel after the operation	The number of bacteria cultured after the removal of the nasal packing
Patient	**Microorganisms**		
1	Coagulase (+) *staphylococci*	+	-
2	Coagulase (+) *staphylococci*	-	+
3	Coagulase (+) *staphylococci*	+	-
4	Coagulase (+) *staphylococci*	+	-
5	Coagulase (+) *staphylococci*	-	+
6	Coagulase (+) *staphylococci*	+	-
7	Coagulase (+) *staphylococci*	-	+
8	Coagulase (+) *staphylococci*	-	+
9	Coagulase (+) *staphylococci*	-	+
10	Coagulase (-) *staphylococci*	+	-
11	Coagulase (-) *staphylococci*	+	-
12	Coagulase (-) *staphylococci*	+	-
13	Coagulase (-) *staphylococci*	-	+
14	Coagulase (-) *staphylococci*	-	+
15	*Peptostreptococci*	+	-
16	*Peptostreptococci*	-	+
17	*Candida* spp	-	+
Total : 17		**8**	**9**

tive infections related to nasal surgery are not very frequent. This is rather a hypothesis due to the fact that case reports presenting the infections that occur following nasal septal surgery have not been well documented (Makitie et al., 2000). Although *Staphylococcus aureus* colonises the nasal mucosa, the risk of bacteriemia is reported to be low after septoplasty operations (Silk et al., 1991). However, nasal septal surgery is categorised as a clean contaminated operation and is accepted to carry an infection risk of 8% (Cruse et al., 1986).

Bacteriemia might create important problems in patients with cardiovascular diseases. In particular, *Streptococcus pyogenes* bacteriemia can result in infections with high risk of mortality such as endocarditis, arthritis and osteomyelitis despite antibiotic treatment. However, bacteriemia related endocarditis due to alpha hemolytic *streptococci* has also been reported (Woog et al., 1988). Toxic shock syndrome, spinal osteomyelitis, meningitis, septic cavernous sinus thrombosis and endocarditis are the infections that have been reported after septoplasty and septorhinoplasty (Leonard et al., 1998). Lerner and Weinstein (1966) claim that in bacterial endocarditis, *Streptococcus viridans* is the causative agent in 50% of the patients and *Staphylococcus aureus* in 20% of the patients. We already know that the nasal passage is a bacteriological reservoir for *Staphylococcus aureus*. Slavin et al. (1983) identified *Staphylococcus aureus* in the noses of 23% of healthy young adults. In our study, in the preoperative period, when the smear cultures that were obtained from the nasal passage were analysed, 35.5% harboured *Staphylococcus aureus*, 10% had *Streptococci* spp. When it comes to the smear cultures obtained from the nasal pack, 39.3% had *Staphylococcus aureus* and 2.7% had *Streptococci* spp.

The latest evidence which shows the presence of transient bacteriemia following diagnostic and surgical manipulations explains the pathogenesis of septic complications during nasal septal surgery (Goldman et al., 1985; Glancy et al., 1996). If the bacteria can reach the circulation through mucosal capillaries during upper and lower gastrointestinal system endoscopies, nasotracheal intubations, tonsillectomies, dental and urological surgical procedures, it can also pass into the blood stream via similar routes during traumas such as nasal mucosal incision, nasal tamponade, septoplasty and septorhinoplasty (Slavin et al., 1983; Kaygusuz et al., 2001). If we accept the fact that the nasal passage is a bacterial reservoir we cannot deny the intensity of this bacterial transfer. Slavin et al. (1983) identified bacteriemia in only one of the 50 patients who had rhinoplasty. In our study, in 7 of the 30 patients who had septoplasty (30.4%) and in 10 of the 23 patients (33.3%) who had septorhinoplasty we identified bacteriemia. The bacteria that grew in the postoperative blood cultures were the same bacteria that were found in the preoperative nasal smear cultures in 7 patients and different in one patient. None of the 17 patients who had bacteriemia in our septoplasty and septorhinoplasty series experienced postoperative problems.

In septoplasty and septorhinoplasty operations the development of bacteriemia might change related to the surgical technique and the duration of surgery (Makitie et al., 2000). In our series, the same surgeons operated all the patients and the patients who had longer operation times than normal were not included in the study. The cleansing of the nasal mucosa before the operation is reported to decrease the risk of devel-

oping bacteriemia (Slavin et al., 1983; Silk et al., 1991; Teichgraeber et al., 1993). We washed the nasal passage with 0.9% sodiumchloride before and after the operation. Yet we identified bacterial growth in 15% of the blood cultures obtained immediately after the operation and 16.9% of the ones obtained at 48 hours postoperatively.

In the few days following the septoplasty nasal surgeons use nasal packs. There is controversial information in the literature regarding the length of stay for nasal packs and different complications have been reported related to nasal packs (De Vries et al., 1989; Illum et al., 1992). However, there is limited information concerning the development of bacteriemia due to nasal packs (Herzon, 1971; Illum et al., 1992). Herzon (1971) reported that nasal packs cause bacteriemia in 12% of the cases. We identified this risk as 16.9%. We think that the utilisation of nasal splints instead of nasal packs for stabilising the septal cartilage and membrane sealing suture techniques as recommended by Sessions (1984) might decrease this risk.
In the studies that were carried out it is reported that antibiotic prophylactics might not be feasible due to the low risk of infections and also added that the cost of antibiotic therapy was expensive and the related hazards might be more important than the infection itself (Krizek et al., 1975; Slavin et al., 1983). Thus, utilisation of prophylactic antibiotic therapy is not recommended in rhinological surgery (Dickman et al., 1976).

In our series, bacteriemia did not cause serious clinical problems after septoplasty and septorhinoplasty. However, it should be kept in mind that bacteriemia might have devastating consequences in patients with cardiovascular problems. We advocate the utilisation of antibiotic prophylactics in patients who are under risk. If we consider the role of the surgical technique utilised and the nasal packs used on the development of bacteriemia, we should concentrate our efforts in inventing new techniques that will minimise such risks. This statement should be provided perhaps in a future study.

REFERENCES

1. Cruse P (1986) Surgical infection: incisional wounds. In: John V. Bennett, Philip S. Brachman (Eds). Hospital infections. Little, Brown and Co, Boston Toronto, pp. 423-436.
2. De Vries N, Van Der Baan S (1989) Toxic shock syndrome after nasal surgery: Is prevention possible? Rhinology 27: 125-128.
3. Dickman MD, Farrell R, Higgs RH, Wright LE, Humphries TJ, Woicik JD, Chappelka R (1976) Colonoscopy associated bacteremia. Surg Gynecol Obstet 142: 173-176.
4. Glancy JJ, Cartoon J (1996) Hazards of transrectal biopsy of the prostate. Med J Aust 164: 320.
5. Goldman GD, Miller SA, Furman DS, Brock D, Ryan JL, Maccallum RW (1985) Does bacteremia occur during flexible sigmoidoscopy? Am J Gastroenterol 80: 621-623.
6. Herzon FS (1971) Bacteremia and local infections with nasal packing. Arch Otolaryngol 94: 317-320.
7. Illum P, Grymer L, Hılberg O (1992) Nasal packing after septoplasty. Clin Otolaryngol 17: 158-162.
8. Kaygusuz İ, Gok U, Yalcin S, Keles E, Kizirgil A, Demirbağ E (2001) Bacteremia during tonsillectomy. Int J Pediatr Otorhinolaryngol 58: 69-73.
9. Krizek T, Koss N, Robson MG (1975) The current use of prophylactic antibiotics in plastic and reconstructive surgery. Plast Reconstr Surg 55: 21-32.
10. Leonard DW, Thompson DH (1998) Unusual septoplasty complication: Streptococcus viridans endocarditis. J ENT 77: 827-831.
11. Lerner PI, Weinstein L (1966) Infective endocarditis in the antibiotic era. N Engl J Med 274: 199-206.
12. Makitie A, Aaltonen LM, Hytonen M, Malmberg H (2000) Postoperative infection following nasal septoplasty. Acta Otolaryngol 543: 165-166.
13. Sessions RB (1984) Membrane approximation by continuous matters sutures following septoplasty. Laryngoscope 94: 702-703.
14. Silk KL, Ali MB, Cohen BJ, Summersgil JT, Raff MJ (1991) Absence of bacteremia during nasal septoplasty. Arch Otolaryngol Head Neck Surg 117: 54-55.
15. Slavin SA, Rees TD, Guy CL, Goldwyn RM (1983) An investigation of bacteremia during rhinoplasty. Plast Reconstr Surg 71: 196-198.
16. Teichgraeber JF, Russo RC (1993) Treatment of nasal surgery complications. Ann Plast Surg 30: 80-88.
17. Woog VK, Wright HT (1988) Group A beta hemolytic streptococci as a cause of bacteremia in children. AJDC 142: 831-833.

Dr. İrfan Kaygusuz
Fırat Üniversitesi Fırat
Tıp Merkezi KBB Kliniği
23200 Elaziğ
Turkey

Tel : +90-424-233 3555
Fax : +90-424-238 8096
E- mail: kaygusuz_67@yahoo.com