

Indication, incidence and management of blood transfusion during sinus surgery: A review over 12 years*

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SUMMARY

The number of reports about blood transfusion-related HIV and hepatitis virus infections is increasing, presently. Thus, it should seriously be considered to inform the patient of any anticipated blood loss necessitating a transfusion of blood products. This is especially necessary for surgical procedures with only a low risk for high blood loss, such as endonasal surgery as a common otorhinolaryngological procedure. However, reports about the incidence of blood transfusion during this kind of surgery are very rare. The medical histories of 6,296 patients who underwent sinus surgery between 1982-1993 in the Department of Otorhinolaryngology at the University of Kiel were analyzed. Twenty-nine of these patients received a transfusion. Risk factors for required blood, the necessity of pre-operative information and the recommendation policy for pre-operative donation of autologous blood are discussed. The intra-operative blood losses of 120 patients who did not require a transfusion and who underwent sinus surgery in 1986 and 1989, were analyzed. The transfusion rate was 0.46% on average during the 12-year period. The incidence of blood transfusion and the amount of intra-operative blood loss decreased after combination of endonasal surgery with controlled intra-operative hypotension (0.07%; $p < 0.01$). Risk factors for the necessity of a transfusion in these cases were extensive polyposis and purulent exacerbation of the disease. There are risks for a blood transfusion in endonasal surgery. Every transfusion carries a certain risk for the infection with HIV or hepatitis, therefore every patient should be informed about the possibility of a blood transfusion prior to the operation. Endonasal microscopic sinus surgery performed by well-trained surgeons, combined with controlled intra-operative hypotension lowered the risk for a transfusion significantly ($p < 0.01$).

Keywords: sinus surgery, blood transfusion, controlled hypotension, transfusion incidence, AIDS

INTRODUCTION

The number of patients with HIV infection has significantly increased within the last years, and this might continue in the future (Raggi and Blanco, 1990; Lefrere and Pillonel, 1992; Dodson et al., 1993). There are numerous reports about transfusion-related HIV infections (Grobelaar, 1992; Yamada et al., 1993; Gleason et al., 1994; Kern and Kroy, 1994). High-risk patients are those suffering from haemophilia and leukaemia due to the necessity of frequent blood transfusion (Petersen et al., 1993; Proietti et al., 1992).

It is of particular interest to surgeons to pre-operatively assess the risk of giving a patient blood products associated with specific

procedures. Knowledge about this risk is very important for otorhinolaryngologists, because endonasal surgery is a common method of surgery in patients with sinusitis. There is only a limited number of reports regarding the risk factors for transfusion and transfusion rates in endonasal surgery (Freedman and Kern, 1979; Hosemann et al., 1992; Weber and Draf, 1992).

This survey was performed to analyze the rate of intra- and post-operative blood supply during a period of 12 years in patients who underwent endonasal surgery for the treatment of chronic sinusitis. Furthermore, risk factors for a blood transfusion, the necessity of pre-operative patient information and the recommendation policy for donating autologous blood are discussed.

This study reveals valid data about the risk for blood transfusion in extra- and endonasal sinus surgery in patients suffering from chronic sinusitis.

PATIENTS AND METHODS

This retrospective study contains all patients who underwent nasal surgery for chronic sinusitis and who received blood transfusion between January 1, 1982 and December 31, 1993, at the Department of Otorhinolaryngology of the University of Kiel. The information was documented in an electronic database for statistical evaluation.

Medical histories and anaesthesiological records were used as databases for details about nasal diagnosis, accompanying diseases, operation procedures and anaesthesiological management. Furthermore, analysis included information about clinical parameters such as patient's age at the time of transfusion, pre-operative blood pressure and intra-operative blood loss. Additionally, Hb, Hct, pT and pTT were documented.

The overall volume substitution was evaluated by counting the amount of intra- and post-operatively given Packed Red Blood Cells, fresh-frozen plasmas, colloid, and cristalloid. To evaluate intra-operative blood loss during different time periods of sinus surgery, the medical histories of an additional 120 patients, who did not get a transfusion and who underwent endonasal surgery in 1986 and 1989 for chronic sinusitis, were evaluated. The average amount of blood loss was estimated for each period separately.

Statistical evaluation

The total number of nasal surgeries was documented by the Institute of Documentation and Statistics at the University of Kiel. Data for the period between 1982 and 1993 were registered. The measured parameters were compared to standards of the reference laboratory. Average, maximum, minimum and standard deviation were calculated for all data.

Each of the three time periods were characterized by different surgical and anaesthesiological techniques. From 1982-1985 the technique most often used was the extranasal approach, from 1986-1988 it was the endonasal approach, and from 1989-1993 it was the endonasal operation technique combined with controlled hypotension.

Statistical analysis followed the criteria of the *t* test. The results were significant at $p < 0.05$.

RESULTS

From 1 January 1982 to 31 December 1993 a total of 6,296 patients underwent nasal surgery for chronic sinusitis at the Department of Otorhinolaryngology at the University of Kiel. Twenty-nine of these patients received a blood transfusion.

The average patient's age was 49.7 years (maximum: 79 years; minimum: 17 years; s.d.: 15.5 years). On average each operation took 172 min (maximum: 395 min; minimum: 30 min; s.d.: 73.5 min). Every parameter (e.g., Hb and Hct) which was pre-operatively already in the normal range, did not change post-operatively (Table 1).

Chronic polypous sinusitis with extensive polyposis was the reason for surgery in 23 patients. Acute purulent exacerbation of chronic sinusitis was found in the other 6 patients. Four patients had also pre-operative complications; Two patients had phlegmones of the orbit and two patients suffered from rhinogeneous meningitis. Sixteen patients had surgery of the paranasal sinuses more than one year before.

On average, either 841 ml blood or 310 ml of Packed Red Blood Cells were substituted. Twenty-six patients were transfused intra-operatively, 3 patients post-operatively. In addition to the transfusion, 531 ml of albumin, 766 ml of plasma expander and 666 ml of cristalloid were given on average (Table 1).

The incidence of transfusion in patients who underwent nasal surgery for chronic sinusitis during the 12-year period was on average 0.46% (maximum: 1.7%; minimum: 0%; Figure 1). From 1982-1985 the average transfusion rate was 0.9% (maximum: 1%; minimum: 0.8%; Figure 2), the same results were obtained from 1986-1988. The incidence of transfusions decreased from 1989-1993 (usually endonasal approach with controlled hypotension) to 0.07% (maximum: 0.1%; minimum: 0%; Figure 2). The difference between these two time periods was significant ($p < 0.01$).

The amount of blood loss during procedures which required blood lay between 1,100 ml to 1,750 ml (average: 1,187 ml). In those patient groups which did not require a transfusion (Figure 3), the intra-operative blood loss decreased from 332.6 ml on average in 1986 (maximum: 1,000 ml; minimum: 100 ml) to 205 ml on

Table 1. Maxima, minima, averages and standard deviations of different pre-operatively measured laboratory parameters. There was no correlation between these parameters and the necessity of blood supply.

parameter	average	maximum	minimum	standard deviation
systolic pre-operative blood pressure (in MPa)	135	220	110	26.7
diastolic pre-operative blood pressure (in MPa)	82	105	60	10
pre-operative erythrocyte (in mill/mm ³)	4.37	4.95	3.14	0.5
hemoglobin pre-operative (in g%)	13.8	16.4	9.2	1.7
quick pre-operative (in %)	93.3	100	62	9.2
blood supply (in ml)	841	2,000	500	437
erythrocyte supply (in ml)	310	500	250	97
substituted plasma (in ml)	531	1,000	250	232
substituted plasma expander (in ml)	766	1,000	500	233
substituted electrolyte solution (in ml)	666	1,500	300	284

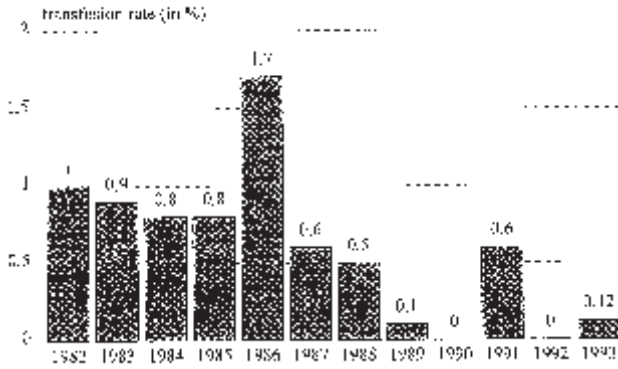


Figure 1. The incidence of blood supply between 1982 and 1993 at the Department of Otorhinolaryngology of the University of Kiel related to different sinus surgery. In general, the rate of transfusion decreased, however, the peak in 1986 may have occurred because a new operation technique (endonasal approach) was established that year.

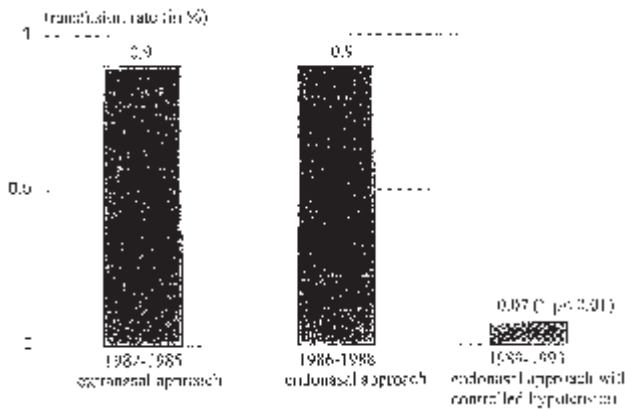


Figure 2. Comparison between different operation techniques and related blood supply. From 1982-1985 extranasal approach was used, from 1986-1988 mainly endonasal surgery was preferred. In both techniques, the transfusion rate was 0.9%. Between 1989 and 1993 the endonasal approach was combined with intra-operative hypotension, the transfusion rate significantly decreased to 0.07% (p<0.01).

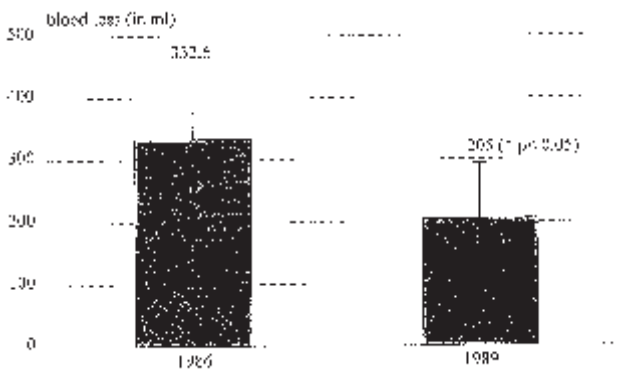


Figure 3. The average amount of intra-operative blood loss per patient in 1986 (endonasal surgery only) and in 1989 (endonasal surgery combined with controlled intra-operative hypotension). The blood loss in 1989 decreased significantly (p<0.01).

average in 1989 (maximum: 900 ml; minimum: 50 ml). The surgical technique in 1986 was the endonasal approach in 1989 usually the endonasal approach combined with controlled hypotension. The difference in blood loss was significant (p<0.05).

DISCUSSION

The increase in transfusion-related infections with HIV or hepatitis virus prompted a number of investigations (Grobbelaar, 1992; Dodson et al., 1993; Degos, 1994). These infection risks are not only important for patients with haemophilia or leukaemia, but also for patients who have to undergo surgery and therefore have an increased risk of infection due to the possible necessity of a blood transfusion (Proietti et al., 1992).

Endonasal surgery is a common procedure in the treatment of chronic sinusitis. Therefore, rhinologists are very interested in the incidence and the risk factors leading to surgery-related blood transfusion. This is especially important in view of the increasing popularity of out-patient surgery.

Reports indicate that the rate of blood transfusions in patients who had endonasal surgery for chronic sinusitis, lies between 0% and 3.7% (Freedman and Kern, 1979; Stankiewicz, 1989; Weber and Draf, 1992; May et al., 1994). The transfusion rate in this survey was shown to be 0.46% between 1982 and 1993. All cases in which a transfusion was necessary, involved either extensive polyposis or acute purulent exacerbation. Two criteria could be shown to be risk factors for the necessity of blood products.

All patients who did not need blood had an average age of 50 years, a significant difference could not be found. The extension of the disease and difficulties, such as heavy bleeding with reduced visibility, are leading to a longer duration procedure (172 min on average with experienced surgeons). Therefore, the duration of a certain procedure does not only depend on a good training level of the surgeon, but also on the individual extension of the disease.

From 1982 to 1985 the extranasal approach as operative technique was preferred, and from 1986 to 1988 endonasal surgery was established (Rudert, 1988). Overall, the amount of support with blood products was the same in both groups. In the beginning of the endonasal technique the support rate was relatively high (1.7%), but it decreased within the following 2 years as surgeons became more adept with this procedure (0.5%). Results suggest a direct relationship between blood loss and the training level of rhinologists. In addition, it is important to realize that the policy for the hemoglobin level as a mark at which a transfusion is started, was lowered from 100 mg% to 80 mg% in 1988. Before 1988 an amount of blood loss higher than 15% of total blood volume indicated a transfusion; from then to present, the department's policy changed to a total volume loss of 20%. Whether or not a transfusion was started, also was influenced by other individual circumstances.

The rate of transfusion significantly decreased (0.07%) in the period between 1989 and 1993. This period was characterized by microscopic and endoscopic endonasal sinus surgery performed by well-trained surgeons in combination with controlled intra-operative hypotension. Using this technique blood loss was

minimized. Also in different fields of head-and-neck surgery positive effects of intra-operative hypotension on the transfusion rate were reported (Schindler et al., 1994).

The *German Society of Transfusion Medicine and Immunohaematology* recommends that patients donate autologous blood, only if the risk for the necessity to give blood products is >5%. On the other hand, the highest reported risk for blood transfusion in nasal surgery for chronic sinusitis is 3.7% (Weber and Draf, 1992). Therefore surgeons should not recommend that patients donate autologous blood in the event they have to undergo endonasal surgery.

There is always a certain risk that blood or blood products are contaminated with HIV or hepatitis virus. This fact should always be considered before starting a transfusion, since an infection with these agents can lead to fatal consequences. Therefore this risk should be discussed with the patient prior to endonasal surgery (Bundschuh, 1992).

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