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Fundamental considerations of the design and function of intranasal antrostomies

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SUMMARY

The operation of intranasal antrostomy was first described by Gooch in 1770 and has been performed since then with varying degrees of popularity. Little is known of the natural history of the antrostomy, particularly about its tendency to close. To elucidate this, researches have been conducted, aimed at establishing a number of measurable factors associated with closure. A clinical study has been conducted which includes a prospective assessment of intranasal antrostomies performed on 55 patients. The size of the antrostomy is assessed per-operatively and at regular intervals post-operatively using direct measurement and serial photography via a modified Hopkins rod. A retrospective study has also been performed on all patients who underwent intranasal antrostomy between 1979–1982, using similar techniques. The results of a statistical analysis of intranasal antrostomies performed since 1950 are also presented as are the results of a survey of the techniques used by surgeons when performing this procedure. The work presented in this paper offers the answers to a number of questions which have been posed about this simple and popular operation.

INTRODUCTION

Although Berengar, anatomist and surgeon at Bologna in the early sixteenth century documented the existence of the paranasal sinuses, the first clear description of the maxillary sinus and associated suppuration was made by Nathaniel Highmore in 1651 and for some time the sinus was referred to by his eponym.

The treatment of maxillary sinusitis by opening and irrigating the sinus by a variety of routes has a long and varied history. Highmore himself advocated decompression by thrusting a silver bodkin through an empty tooth socket. Many of the earliest writers including Cowper (1717) and Meibomius (1718) recommended irrigation through the alveolar margin after molar tooth extraction. John Hunter (1835) was one of the first proponents of the intranasal approach and

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Zuckerkandl (1893) initially advocated perforation of the middle meatus but later abandoned the technique because of the potential for orbital damage.
The first description of an inferior meatal antrostomy was probably by Gooch in the 1770's (Cordes, 1905) but Mickulicz (1886) must take the credit for the popularisation of the technique.
There are a number of questions associated with intranasal antrostomies which remain unanswered. It is commonly accepted that closure may occur but if the antrostomy closes, how does it close, how quickly does it close, and what measurable factors are associated with closure? Is it simply a question of operative technique or does it depend on factors associated with the patient such as age or on individual variation. The role of the initial size of the antrostomy particularly requires elucidation as it is regarded by many as the most important determining factor.

METHOD AND MATERIALS

To obtain detailed information on the procedure, a 30 item questionnaire was sent to all ENT consultants in Great Britain of which over 70% were returned. Information was sought on the exact technique employed, including instrumentation and on the optimum dimensions of the antrostomy. Questions related to length of patency and important factors for the success of the procedure were posed as well as indications for the operation.
To more accurately assess the popularity of the procedure the statistics for intranasal antrostomies and Caldwell-Luc operations between 1950 and 1983 at the Royal National Throat, Nose and Ear Hospital, London were examined.
A retrospective analysis of 95 patients who had had intranasal antrostomies performed between 1979–1982 was done by requesting them to attend the hospital so that patency and size of the antrostomy could be assessed. This was done by direct assessment via a 4 mm diameter O' Hopkins rod and a photograpic system employing an Olympus camera incorporating a graticule, and a Storz Xenon light source.
A prospective study was begun in 1982, in which 55 patients undergoing intranasal antrostomy have had an accurate assessment made of antrostomy size at operation using the photographic technique described above and by direct measurement. The patients are then followed-up at regular intervals when any closure can be carefully monitored. Factors relevant to closure such as initial size, operative technique and post-operative care can be evaluated.

RESULTS

Results of the questionnaire show clearly that the inferior meatal route (94%) under general anesthesia (95%) is most popular. Whilst everyone agreed on the necessity of enlarging the initial perforation, over 40 different instruments were

suggested for this purpose and what was considered an adequate size varied from 1.0×0.5 cm to $> 2.0 \times > 1.0$ cm. Opinion was divided on the length of patency of the antrostomy and ranged from permanently (24%), to one month (2%), with the majority favoring three years or longer (35.6%).

Patency was regarded as important to successful treatment and the majority (92%) felt that initial size was the most important factor in determining this. From a wide range of conditions, chronic sinusitis was the commonest indication (79%) for the operation.

When the operative statistics between 1950 and 1983 are examined, they demonstrate that there has been a marked upward trend in the popularity of intranasal antrostomy. This is independant of the total number of operations performed annually and is at the expense of Caldwell-Luc procedures (Figure 1).

In the retrospective study, they were 50 men and 45 women, their ages ranging from 7 to 73. On initial attendance, an average of 26 months had elapsed since the operation. 179 intranasal antrostomies had been performed in all, of which 53% were closed and 42% patent (Figure 2). The average age of those patients in whom the antrostomy had closed completely was 35.8 years compared with 45.7 years in

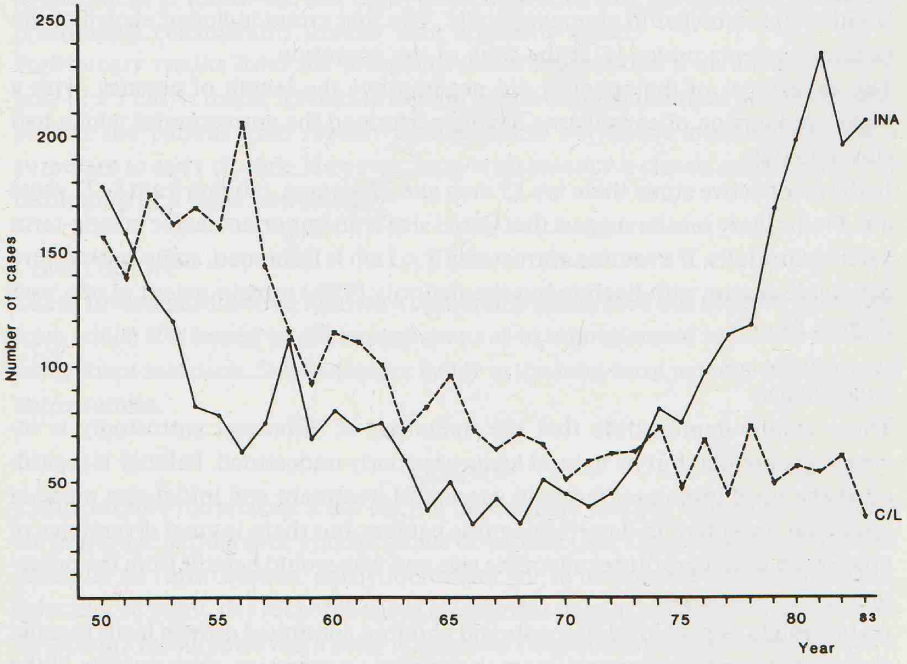

Figure 1. Graph showing annual numbers of intranasal antrostomies and Caldwell-Luc operations performed at the Royal National Throat, Nose and Ear Hospital between 1950 and 1983.

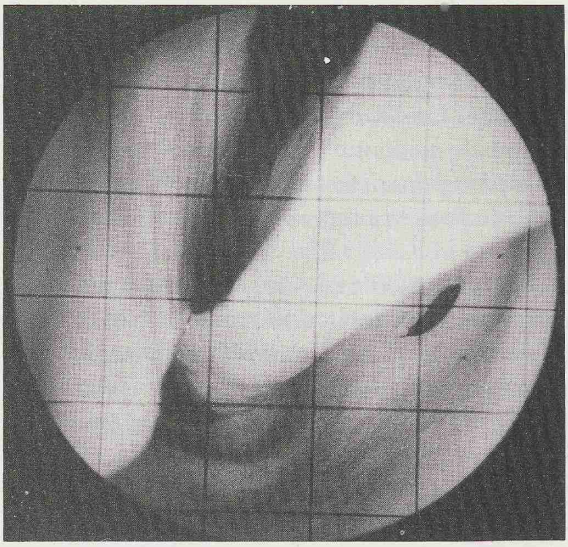

Figure 2.
Photograph showing left inferior meatal antrostomy in a patient at eighteen months.

the group with patent antrostomies confirming the clinical impression that antrostomies close quicker in younger people. The first group included eleven of the thirteen patients under 16 at the time of the operation.

The experience of the operator did not improve the length of patency, with a higher proportion of consultants having performed the antrostomies which had closed (53%).

In the prospective study there are 33 men and 22 women, ranging from 8–77 years old. Preliminary results suggest that initial size is an important factor in long-term patency in adults. If a routine antrostomy 2 × 1 cm is fashioned, some contracture inevitable occurs with healing but the majority (95%) remain patent at one year (Figure 3).

DISCUSSION

These results demonstrate that the operation of intranasal antrostomy is increasingly popular but its natural history is poorly understood. Patency is regarded as the most important factor in successful treatment and initial size made at operation important in determining this patency but there is great divergence of opinion on what constitutes adequate size and who would benefit from the operation.

As one might expect in adolescents and children continued growth leads to rapid closure but in adults it would seem that whilst a proportion close quickly, if the intranasal antrostomy is patent at one year, it remains patent. In a retrospective analysis, as the initial size of the hole is unknown, it is difficult to assess the

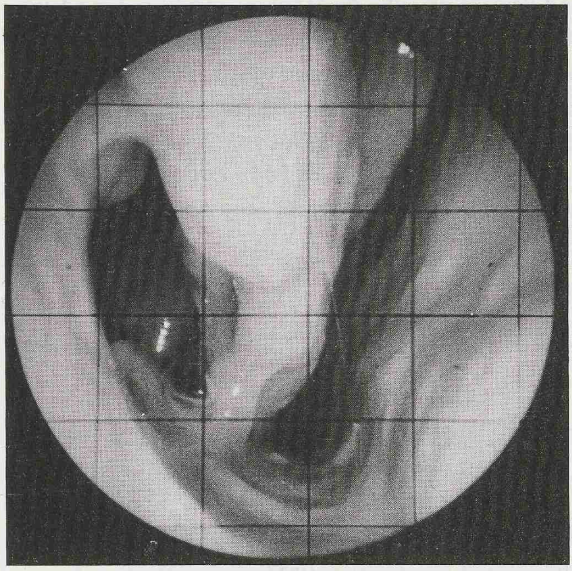

Figure 3.
Photograph showing right inferior meatal antrostomy in a patient at one year.

appearances at follow-up, but many presented with tiny perforations which are presumably considerably smaller than originally made.
Preliminary results from the prospective trial suggest that if an adequate sized hole (2 × 1 cm) is made, it tends to remain open although this does not necessarily protect the patient from further problems and persistent infection may be a stimulant to early closure. However, long-term patency is clearly enhanced by the fashioning of a large antrostomy.

CONCLUSION

These investigations shed light on a commonly performed but obscure operation from which it is hoped to offer suggestions as to improvement in both technique and patient selection. Size is a major factor in the long-term patency of intranasal antrostomies.

RÉSUMÉ

L'antrostomie intranasale a été décrite la première fois par Gooch en 1770 et a été pratiquée depuis avec plus ou moins de satisfaction. On connaît peu l'histoire naturelle de l'antrostomie, particulièrement sur sa tendance à se refermer. Pour éclucider ce point, des recherches ont été menées dans le but d'etablir un nombre de facteurs mesurables lies a cette tendance a l'obstruction. Une étude clinique a été entreprise qui comprend une analyse prospective de 55 patients opérés d'antrostomie intranasale. La taille de l'antrostomie est analysée en per-opératoire et à intervalles réguliers en post-opératoire en utilisant des mesures directes et des

séries de photographies prises à travers un tube de Hopkins modifié. Une étude rétrospective a également été faite avec les mêmes techniques, sur tous les patients ayant bénéficié d'une antrostomie intranasale entre 1979 et 1982. Les résultats statistiques des antrostomies intranasales pratiquées depuis 1950 sont aussi présentés ainsi qu'une revue des techniques utilisées par les chirurgiens qui pratiquaient cette opération. Le travail présenté dans cette communication apporte les réponses à de nombreuses questions qui ont été posées sur cette opération simple et très répandue.

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