BLOOD LOSS IN TONSILLECTOMY*

JACK JACOBSON,† M.B., CH.B., D.C.H., D.A., F.F.A.R.C.S., *Department of Anaesthesia, Groote Schuur Hospital, Cape Town*

A series of cases is presented here in an attempt at assessing the average amount of blood lost in tonsillectomy. As intubation is tending to supersede the older methods, it was decided to investigate, in addition, whether there was any difference in the amount of blood lost by the intubated as compared with the non-intubated patient, and whether the fact that respiration was spontaneous or controlled caused any alteration in haemorrhage.

The investigation was performed on 48 patients, of whom 32 were children undergoing tonsillectomy and adenoidectomy and 8 were adults undergoing tonsillectomy alone. All patients were anaesthetized by myself and were operated on by several different surgeons.

METHOD

Anaesthesia

No attempt was made to use any one particular anaesthetic agent, as a previous investigation[1] has shown that this is of little importance. Essentially, the series can be divided into those patients intubated and those not intubated. In the former group, IPPR was performed in some, while others were allowed to breathe spontaneously. Induction agents included ether, thiopentone, or halothane with nitrous oxide and oxygen. All adults and large children received thiopentone, while smaller children were given nitrous oxide, oxygen and halothane. When intubation was performed, it was done either under halothane anaesthesia or by using suxamethonium. Intubation in adults was achieved by nasotracheal tube and in children by orotracheal tube, using an Ozorio[2] connection to which was attached the Jackson Rees modification of an Ayres T-piece. In large children and adults a Magill circuit was used for spontaneous respiration. When IPPR was instituted, a Boyle Mark II circle absorber was used.

Anaesthetic agents which were used to maintain anaesthesia included nitrous oxide and oxygen with halothane or ether. IPPR was performed by employing halothane or intermittent suxamethonium or gallamine.

All orally-intubated patients had a Doughty mouth gag inserted, while in both nasotracheal and non-intubated groups a Boyle-Davis gag was used.

Selection of patients for intubation and IPPR was carefully controlled in an unbiased manner. Whether a patient was intubated or not depended on the evenness or unevenness of a predetermined digit of his hospital admission number. The same method was used for determining whether he should breathe spontaneously or not.

All tonsils were removed by dissection and the average operating time was 30 minutes.

BLOOD-LOSS DETERMINATIONS

As the amounts lost were frequently small, the colorimetric method was used.[3-5] This was done with an EEL colorimeter.

Before the series was commenced, known volumes of blood with a known haemoglobin content were added to 10 litres of water containing 5 ml. of strong ammonia, and readings were taken from the colorimeter for each increase in volume of blood. From this a graph could be constructed, with volume of blood along the ordinate and reading on the colorimeter along the abscissa.

All blood lost by the patient onto swabs and into the sucker bottle was added to a measured volume of 10 litres and thoroughly mixed. A sample of this diluted blood was inserted into the colorimeter, and from the reading the volume of blood lost could be determined by reference to the prepared graph. A correction was made for the patient's haemoglobin concentration.

This is a useful method by which small volumes of blood can be accurately determined.

RESULTS

As patients were of different sizes, it was considered best to express blood loss as a percentage of calculated blood volume. This was taken to be 40 ml./lb. in children and 35 ml./lb. in adults. The results showed a considerably smaller loss than in most other reported series (Table I).[1,6-12]

TABLE I. BLOOD LOSS DURING TONSILLECTOMY

	Intubated	*Not intubated*	*IPPR*	*Spontaneous respiration*
Blood loss as % of blood volume	3·57	3·98	3·46	3·57
No. of cases	18	16	13	18
SD	2·17	1·64	1·59	2·17

These results are not statistically significant. In both comparisons $P>0.99$, and it seems to make little difference whether intubation is performed or not, or whether ventilation is controlled. Despite the relatively small number of cases involved, it seems evident that there would be little use in extending the series.

The average blood loss in the whole series was 3·64% of blood volume. No patient lost above 10% of blood volume.

DISCUSSION

The investigation proved to be disappointing. It was felt that on a theoretical basis non-intubated patients and those breathing spontaneously on a basis of hypercarbia and poor airway control would lose more blood than the other 2 groups, but this was not borne out by the figures obtained. There was, in fact, a strikingly close correlation between all 4 groups.

The average loss of 3·64% of blood volume compares very favourably with other series. In Holden and Maher's[1] series, the majority of cases lost between 5 and 10% of blood volume, while 4% of cases lost over 15% of blood volume. Spoerel *et al.*[6] found a loss exceeding 10% in 18% of cases. Eight percent of Shalom's[10] cases lost over 10%. In the current investigation, only one case lost as much as

*Date received: 5 March 1968.

†Present address: Department of Anesthesiology, Wayne State University, 1400 Chrysler Freeway, Detroit, Michigan 48207, USA.

8·97% of calculated blood volume. The smallest loss recorded was 0·85%. To account for the relatively small amounts lost, it seems likely that the combination of a single anaesthetist and experienced surgeons was a significant contributing factor.

Though no difference in blood loss was shown in intubated as opposed to non-intubated patients, there was little doubt that the technique involving oral intubation, Ozorio connector and Doughty gag was infinitely superior to the older method of insufflation by means of a Boyle-Davis gag. The much greater speed of induction, lighter plane of anaesthesia required, absence of laryngeal spasm, ability to rapidly deepen anaesthesia, complete control of the airway, improved safety against the inhalation of blood, ability to perform IPPR and absence of otherwise unavoidable anaesthetization of the operating surgeon made the sole disadvantage pale into insignificance. This disadvantage concerns the fact that the tonsils are slightly less accessible as the Ozorio connector and tube are in the central slot of the Doughty gag.

SUMMARY

An investigation was made into blood loss during tonsillectomy. The average loss was 3·64% of estimated blood volume. No significant difference in blood loss was determined in patients breathing spontaneously versus those with controlled respiration, or in patients who were intubated versus a non-intubated group.

I wish to express my thanks to Prof. A. B. Bull and Dr. G. G. Harrison for their interest, and to the surgeons and nursing staff in the ENT department for their cooperation.

REFERENCES

1. Holden, H. B. and Maher, J. J. (1965): Brit. Med. J., **2**, 1349.
2. Ozorio, H. P. and Cohen, M. (1964): Brit. J. Anaesth., **36**, 432.
3. Rains, A. J. H. (1955): Brit. J. Surg., **43**, 191.
4. Roe, C. F., Gardiner, A. T. S. and Durdley, H. A. F. (1962): Lancet, **1**, 672.
5. Rustad, H. (1963): *Ibid.*, **1**, 1304.
6. Spoerel, W. E., Hersey, L. W. and Greenway, R. A. (1960): Canad. Med. Assoc. J., **82**, 1265.
7. McKenty, F. D. (1937): *Ibid.*, **36**, 611.
8. King, H. C. and Story, S. R. (1959): Arch. Otolaryng., **70**, 153.
9. King, J. T. (1954): Ann. Otol. (St. Louis), **63**, 1029.
10. Shalom, A. J. (1964): J. Laryng., **78**, 734.
11. De Reynier, J. P. (1959): Pract. oto-rhino-laryng. (Basel), **21**, 18.
12. Maier, H. L. and Bogue, C. R. (1960): Northern Medicine, **59**, 910.
13. Ruggles, R. L. (1960): Ann. Otol. (St. Louis), **69**, 360.