THE REDUCTION OF BLEEDING IN HARE-LIP AND CLEFT-PALATE SURGERY

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SUMMARY

A technique is described to reduce bleeding during operation for the correction of hare-lip and cleft-palate. The principle is to inject a vasoconstrictor solution around the arteries at their points of entry to the lip and palate. A total of not more than 2 ml is used of lignocaine 2 per cent combined with 1:80,000 adrenaline. A series of 125 operations was completed without adrenaline and the results were compared with those of two series (of 135 and 113 operations) in which adrenaline was used. A comparison of results demonstrates the efficiency of this technique.

Tempest (1958–59) has drawn attention to the considerable loss of blood which frequently occurs in hare-lip and cleft-palate surgery, and the bad effect which this may have on the child's postoperative recovery.

Another disadvantage of this bleeding is the extent to which it obscures the field of operation, thereby slowing the surgeon and making an accurate repair more difficult. If bleeding can be reduced, then the patient may benefit from a shorter more efficient operation, as well as from diminished blood loss.

METHOD

Of the recognized methods which effectively reduce bleeding from cut surfaces, namely hypotension, hypothermia (Kilduff, Wyant and Dale, 1956), the use of a tourniquet, and local injection of a vasoconstrictor, it was decided that only the last was practicable for our cases.

Since the infiltration of the palatal flaps might imperil healing, and infiltration of the lip edges would distort them and interfere with the marking of the incisions, the injection of a vasoconstrictor is made only at key points where the arteries supplying the upper lip, prolabium and palate enter these structures, thus minimizing distortion and tension (Tempest, 1958–59).

The children are prepared for operation in the orthodox manner (Gaisford and Lightwood, 1954), and premedication with hyperdural atropine 0.3 mg below six months and 0.45 mg below two years of age is given. Anaesthesia is induced with nitrous oxide, oxygen, halothane and ether in a semi-rebreathing circuit and oral intubation is performed in plane three of the third stage of anaesthesia. Thereafter,
Anaesthesia is maintained with oxygen, halothane and ether using a T-piece technique.

The injections are made by the anaesthetist with a Sterling dental cartridge syringe using 2 per cent lignocaine with 1 in 80,000 adrenaline. A total of not more than 2 ml is used.

For the palate, injections are made at the site of the greater palatine foramina, the incisive foramen, and at the lateral attachments of the soft palate. The injections in the lip are made laterally to surround the superior labial arteries lying between the mucosa and muscle layer. In the floor of the nose they are made on each side of the septum anteriorly, at the incisive fossa, and on each side close to the infra-orbital foramen. All these sites are approached from the mucosal aspect, not through the skin.

Before the patient is draped, an intramuscular injection of pethidine is given, the dose being 0.5 mg/lb. body weight (1.1 mg/kg). (The pethi-
Fig. 3
Showing the distribution of age, weight and blood loss as percentages of each surgical group in the series of 125 patients in whom adrenaline was not injected.
Fig. 4
Showing the distribution of age, weight and blood loss as percentages in each surgical group of the first series of 135 patients in which lignocaine 2 per cent and adrenaline 1 in 80,000 was injected in a quantity not exceeding 2 ml.
dine is diluted with water containing hyaluronidase to a concentration of 20 mg in 2 ml.) In addition, a diaphragm stethoscope is fixed to the precordium, so that the anaesthetist may listen to the heart and breath sounds throughout the operation.

RESULTS

The results are shown in a comparison between 125 cases completed without injection and 135 cases completed subsequently with injection of adrenaline. During the preparation of this paper a further 113 patients have been anaesthetized using adrenaline and the results have been included in separate tables to give additional confirmation of the value of this method. The distributions of age, weight, and blood loss in the three series are shown in figures 3, 4 and 5.

The total blood loss during the operation was estimated from the sucker bottle contents and by swab weighing. The details of measurement were as follows. The swabs were made of gauze and weighed 1.5 g each with a variation of about 0.25 g either more or less than this figure. They were used dry. The scales used was a proper balance weighing to the nearest gramme. One gramme weight was taken as equivalent to one millilitre of blood. The contents of the sucker bottle were measured in a glass measure. Any water in the sucker tubing or bottle at the beginning of the operation was emptied out, so that only blood unmixed with water was measured. Before the measurement was made at the end of the operation any free blood in the sucker tubing was allowed to drain into the bottle. The main inaccuracies would therefore be the slight variations in the weights of the swabs and the film of blood which adheres to the walls of the sucker tubing after drainage.

The child's blood volume was estimated on the basis of 45 ml/lb. body weight (100 ml/kg), (the children being between three months and two years of age), and the total loss was expressed as a percentage of this.

Table I shows a comparison between 125 cases carried out without injection of adrenaline and the first 135 carried out with adrenaline. In each group the cases are divided into those losing less than 6 per cent of their blood volume and those losing over 6 per cent. The number of cases falling into each of these categories is expressed as a percentage of the total number of cases, as this allows of an accurate comparison between the groups of unequal numbers of cases.

The group with the highest percentage of cases, i.e. the modal group, was the 9 to 12 per cent group without adrenaline and the 3 to 6 per cent group with vasoconstrictor.

It will be seen that the addition of adrenaline has shifted a high percentage of cases from the over 6 per cent blood loss group, into the under 6 per cent loss group especially in the "lip only" and "palate only" classes.

Table II shows that in the further series of 113 cases in which vasoconstrictor was used the results are almost identical with those in table I.

The actual operating time was recorded and divided into 5-minute periods. The total percentage of blood volume lost divided by the number of 5-minute periods of operating time, gave the percentage of blood volume lost in each 5 minutes of operating. This is an expression of the average rate of bleeding.

TABLE I
Comparison of total blood loss expressed as a percentage of blood volume.

<table>
<thead>
<tr>
<th>Type of Operation</th>
<th>No vasoconstrictor</th>
<th>With vasoconstrictor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases</td>
<td>Loss 0-6%</td>
</tr>
<tr>
<td>Lip and Palate</td>
<td>25</td>
<td>4%</td>
</tr>
<tr>
<td>Lip only</td>
<td>34</td>
<td>21%</td>
</tr>
<tr>
<td>Palate only</td>
<td>66</td>
<td>7%</td>
</tr>
</tbody>
</table>

TABLE II
Total blood loss expressed as a percentage of blood volume in a further 113 cases.

<table>
<thead>
<tr>
<th>Type of operation</th>
<th>With vasoconstrictor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases</td>
</tr>
<tr>
<td>Lip and palate</td>
<td>26</td>
</tr>
<tr>
<td>Lip only</td>
<td>35</td>
</tr>
<tr>
<td>Palate only</td>
<td>52</td>
</tr>
</tbody>
</table>
Fig. 5
Showing the distribution of age, weight and blood loss as percentages in each surgical group of the second series of 113 patients in which lignocaine 2 per cent and adrenaline 1 in 80,000 was injected in a quantity not exceeding 2 ml.
Table III shows a comparison between the average rate of bleeding in the series of 125 cases operated upon without adrenaline and the first series of 135 cases in which adrenaline was used. The results are again arranged in two classes: loss of less than 1 per cent of blood volume and loss of more than 1 per cent. The numbers of cases are expressed as percentages of the total numbers in each group.

The modal groups for “lip and palate” and “palate only” were 1 to 1.5 per cent without adrenaline and 0.5 to 1 per cent with adrenaline. The modal groups for “lip only” were 0.5 to 1 per cent without adrenaline and 0 to 0.5 per cent with adrenaline.

Table IV shows the results in the further series of 113 cases with adrenaline and strongly supports the evidence given in table III.

A $\chi^2$ test of the significance of the difference in results between the two techniques was applied to the summed two series (tables III and IV combined), using Yates’ correction where necessary, and the values for $P$ are shown in table V.

There is a highly significant difference between the results obtained using the two techniques. The reduction in the total percentage of blood volume lost in the cases when a vasoconstrictor was used may therefore be directly attributed to a reduction in the average rate of bleeding. Furthermore, this effect was achieved in a high proportion of cases, particularly in the “lip only” and “palate only” classes. The reason why better results were obtained in these classes by comparison with the combined lip and palate cases was certainly due to a similar volume of vasoconstrictor solution being dispersed between both lip and palate and therefore in smaller quantities at each site.

**DISCUSSION**

The method used for measuring blood loss in these small patients was the most accurate available. The errors to which it was subject were of a similar degree and common to all the cases in each series and permitted a valid comparison to be made of the old and new techniques. The definite improvement in results using the new technique is therefore expressed in moderate terms: namely, there was a considerable increase in the number of cases having only a small blood loss.

Before the present technique was evolved, attempts were made to reduce bleeding by improvements in the airway and the use of halothane. Some slight improvements in the airway have been achieved and continue to be developed, but these do not seem to make any measurable difference to bleeding. Halothane
made no difference and has only continued in use as a help during induction and to make the maintenance of anaesthesia more flexible. Used alone it tended to depress respiration too much and was associated with shivering and laryngeal spasm during recovery. The use of pethidine reduces postoperative restlessness and blood loss in the ward from oozing in palate cases, but has no obvious advantage during anaesthesia.

The use of adrenaline with halothane is open to criticism because halothane sensitizes the heart to the action of adrenaline (Brindle, Gilbert and Millar, 1957) and this is still so when halothane is used with ether (Raventós and Dee, 1959). In dogs, the development of irregularities and their subsequent duration, depends upon the dose of adrenaline in relation to body weight and the rate of administration (Raventós, 1956). In these cases, the heart beat was listened to throughout the procedure and no irregularities of rhythm or rate were noted. Also, the dose of adrenaline is very small, being not more than 0.025 ml of 1 in 1,000 adrenaline. The particular mixture of adrenaline with lignocaine was used because it is available in cartridges for the dental syringe. It requires considerable pressure to inject into the palate and this syringe, with its fine needle, is admirable for the purpose.

The injection of local anaesthetic has a detrimental effect upon wound healing in rabbits, in proportion to the concentration employed, and the effect is more marked if it is combined with adrenaline (Nilsson and Wendeberg, 1957). No observable effect had been noted in these cases. Those in which local injection was used healed as well as those in which it was not used.

In conclusion, experience at this hospital has shown that this technique is effective and safe, nor does it endanger healing.

ACKNOWLEDGMENTS

I should like to express my indebtedness to Mr. R. Champion for his patience and encouragement in the development of this technique, to the nursing staff of the Duchess of York Hospital for Babies, and to Miss Marion Russell for her valuable help with the statistical evaluation of the results.

REFERENCES


