of the presenting symptomatology of sickle-cell disease needs to be emphasized, especially in a country like Britain, where the incidence of the condition is likely to increase, not decrease.

Intractable epistaxis has been described (Mabayoje, 1956; Hook and Cooper, 1958), but never in association with such symmetrical facial-skin scarring. Cornbleet *et al.* (1949) reported the cases of three male patients, aged 5 to 25 years, with sickle-cell anaemia who had a peculiar type of alopecia limited to the lateral parts of the scalp in a somewhat symmetrical pattern. The loss of hair in this area was intensified by crises. Paterson and Sprague (1959) described the case of a 15-year-old negro girl who suffered loss of hair from scalp and forearms during crises, the hair growing again during remissions. The only way I could explain the present case was to assume that extreme peripheral vasoconstriction took place in the face "in sympathy" for the blood loss through the nose. Such vasoconstriction was severe enough to cause skin necrosis. I prefer this explanation to the rather obvious one that the facial ulcerations were due to a thrombotic phenomenon, and for these reasons: (1) the remarkable symmetry of the lesions makes it difficult to believe that sickled erythrocytes were so correctly sequestered; and (2) the girl denied using ice compresses or other mechanical applications to the face. Margolies (1951) pointed out that ulcers may follow trauma, or appear spontaneously, or follow infection.

Summary

Symmetrical facial-skin ulceration associated with severe epistaxis is described for the first time in sickle-cell anaemia.

It is suggested that extreme reflex vasoconstriction in the skin of the face precipitated skin necrosis. The variability of the presenting symptoms in sickle-cell disease is underlined.

I am grateful to Dr. S. R. A. Dodu, Physician-Specialist and Head of the Department of Medicine, Ghana Medical School, under whom the patient was admitted, for allowing me to publish the case.

REFERENCES

- Cook, J. E., and Meyer, J. (1915). *Arch. intern. Med.*, **16**, 644.
 Cornbleet, T., Schorr, H. C., and Barsky, S. (1949). *Arch. Derm. Syph. (Chic.)*, **59**, 519.
 Corrigan, J. C., and Schiller, I. W. (1934). *N. Engl. J. Med.*, **210**, 410.
 Cummer, C. L., and LaRocco, C. G. (1940). *Arch. Derm. Syph. (Chic.)*, **42**, 1015.
 Herrick, J. B. (1910). *Arch. intern. Med.*, **6**, 517.
 Hook, E. W., and Cooper, G. R. (1958). *Sth. med. J. (Bgham, Ala.)*, **51**, 610.
 Huck, J. G. (1923). *Johns Hopk. Hosp. Bull.*, **34**, 335.
 Hughes, J. G., Diggs, L. W., and Gillespie, C. E. (1940). *J. Pediat.*, **17**, 166.
 Mabayoje, J. O. (1956). *Brit. med. J.*, **1**, 194.
 McGavack, T. H., and Nussbaum, C. C. (1942). *Urol. cutan. Rev.*, **46**, 194.
 Margolies, M. P. (1951). *Medicine (Baltimore)*, **30**, 357.
 Mason, V. R. (1922). *J. Amer. med. Ass.*, **79**, 1318.
 Ormsby, O. S., and Montgomery, H. (1954). *Diseases of the Skin*, 8th ed. Kimpton, London.
 Paterson, J. C. S., and Sprague, C. C. (1959). *Ann. intern. Med.*, **50**, 1502.
 Steinfield, D. E., and Klauder, J. V. (1927). *Med. Clin. N. Amer.*, **10**, 1561.
 Washburn, R. E. (1910–11). *Virginia med. (Semi-)Mth.*, **15**, 490.
 Winsor, T., and Burch, G. E. (1945). *J. Amer. med. Ass.*, **129**, 792.
 Wintrobe, M. M. (1951). *Clinical Hematology*, 3rd ed. Lea and Febiger Philadelphia.

Preliminary Communications

Prevention of Gastric Inflation During Neonatal Respiratory Resuscitation

Brit. med. J., 1965, **2**, 860–861

In a previous report (Williams and Beasley, 1964) we showed that simple mouth-to-mouth resuscitation was of no value in newborn lambs with atelectatic lungs, for it was observed that this method caused the stomach to distend before the lungs began to expand, and this is a complication that causes difficulties in the establishment of respiration. We concluded that the results of those experiments, though performed on stillborn lambs, could be applied to the newborn human child.

Where facilities for endotracheal intubation exist and the attendants possess the necessary skill and experience, the mouth-to-mouth method has nothing to commend it in dealing with a newborn infant who has not attempted respiration, but, because of lack of experience, not all practitioners, and few midwives, are skilled in introducing an endotracheal tube.

If distension of the stomach, which is the major drawback of the mouth-to-mouth method, could be prevented, the lungs would expand more quickly and at a lower pressure. A cuffed gastric tube was therefore devised to be passed down the oesophagus, and by inflating the cuff the oesophagus would be blocked, thus preventing air entering the stomach. There are

two important reasons for using a gastric tube: (1) midwives are experienced in passing such a tube, and (2) emptying of the stomach is an important step in resuscitation of the newborn.

The tube used for lambs consists of 40 cm. of 5 mm. outside diameter plastic tubing (Fig. 1, AB). Its distal end (B) is occluded, but there are two small holes in the last 5 cm. Fused to this tube is a very narrow-bore tube 1.5 mm. outside diameter (C). This narrow tube has a wide opening (D) which fits a Luer type syringe (Fig. 2), and 2.5 cm. distally it enters a small balloon (E). At 8 cm. from the end of the main tube the narrow tube ends in another balloon 2.5 cm. long (F) which completely surrounds and is welded to the main tube. When a syringe is fitted to the mouth of the narrow tube and air is injected the proximal and distal balloons will distend. A small cap (G) is incorporated to close the opening of the narrow tube so that the syringe may be removed without loss of air from the balloons. The proximal end of the gastric tube (A) is also wide enough to fit a Luer type syringe in order to empty the stomach.

EXPERIMENTS

The method that we reported previously (Williams and Beasley, 1964) was again used, but in this series the cuffed gastric tube was employed. This was passed blind, and no difficulty was experienced in passing it.

Fourteen stillborn and five neonatal dead lambs were used, and the experiments were performed within 24 hours of death.

The chest and abdomen were opened, and the tube was passed down the oesophagus until the tip was felt in the first part of the lamb's stomach. Air was then injected into the balloons, and mouth-to-mouth breathing, through an airway, was started.

RESULTS

In the five neonates it did not matter whether the balloons were inflated or not, for the lungs, which were aerated to a varying degree, easily expanded to completion with mouth-to-mouth respiration.

In eight stillbirths 5 ml. of air was injected into the balloons. Mouth-to-mouth breathing was followed by rapid expansion of the lungs without any gastric distension. The position of the distended distal balloon was varied during these experiments so as to observe if its distension caused compression of the adjacent trachea. Whether it was above, at, or below the level of the origins of the bronchi, expansion of the lungs occurred and continued without difficulty.

In the other six stillbirths mouth-to-mouth breathing was started, either without the tube or with the balloons uninflated, and in these the stomach immediately began to distend. Then, before the lungs showed any evidence of expansion, air was injected into the balloons and mouth-to-mouth breathing continued. The stomach did not distend any further, but the lungs immediately began to expand.

Separate experiments on the distensibility of the distal balloon showed that after injecting 1 ml. the balloon was fairly firmly inflated and had a diameter of 11 mm., and after 5 ml. its diameter had increased to 13.5 mm., a difference of only 2.5 mm. In two of the six, therefore, the balloons were inflated by 1 ml. of air and in one by 2 ml., but the effect of the mouth-to-mouth breathing was the same as when 5 ml. was injected. Thus the seal required to close the oesophagus was provided by only slight expansion of the balloon.

The oesophagus in two lambs was tested to see if larger volumes of air injected into the balloons caused any damage. In one of them there was no mucosal split when 20 ml. was injected and held for one minute, but in the other, though there was no tear after 15 ml., a tear appeared when 20 ml. was injected.

DISCUSSION

This second series of experiments with the mouth-to-mouth method of resuscitation with a cuffed gastric tube clearly showed that when the oesophagus was obstructed by a distended balloon the lungs expanded easily and quickly. Thus the chief disadvantage of the method has been removed by using a tube that requires little training or experience to pass quickly and without trauma.

Ruben *et al.* (1961) suggested that external pressure on the trachea was useful in the anaesthetized adult to prevent the entry of air into the stomach, but we found, in lambs, that it was very easy to occlude the trachea as well as the oesophagus. Pressure by the hand on the upper abdomen did prevent gross distension but not the initial distension of the stomach; nevertheless, such a procedure does lead to an increased risk of regurgitation of gastric contents.

In our opinion, therefore, when babies are born in an apnoeic state in the absence of personnel skilled in passing an endotracheal tube a cuffed gastric tube should be passed followed

by mouth-to-mouth breathing, employed gently and with the usual safeguards with regard to pressure.

The tube used for lambs is not suitable for human neonates, and we are therefore trying out a modified tube. The results will be reported later.

SUMMARY

Experiments with an inflated cuff on a gastric tube have shown that when the oesophagus was obstructed by the inflated

FIG. 1.—Tube—balloons not inflated. FIG. 2.—Tube—balloons inflated and cap inserted. Syringe attached for gastric suction.

cuff atelectatic lungs were easily and quickly expanded by the mouth-to-mouth method of resuscitation.

We should like to thank Dr. K. B. Sinclair, of the Animal Husbandry Department of the University College of Wales, Aberystwyth, and Mr. R. Evans, M.R.C.V.S., for supplying us with the dead lambs used in these experiments. We are grateful to Portland Plastics for making the tubes; to Mr. Gwyn Martin for the photographs; and to Mr. E. Savage for filming the experiments.

This study was aided by a grant from the Welsh Hospital Board.

G. F. WILLIAMS, M.B., CH.B., F.R.C.O.G.,
Consultant Obstetrician and Gynaecologist.

W. H. BEASLEY, M.D., M.C.PATH.,
Consultant Pathologist.

General Hospital,
Aberystwyth.

REFERENCES

- Ruben, M., Knudsen, E. J., and Caraguti, G. (1961). *Acta anaesth. scand.*, 5, 107.
Williams, G. F., and Beasley, W. H. (1964). *Lancet*, 2, 443.