ing, because of difficulty in swallowing, pain, cachexia, and changes in the voice, sometimes with difficulty in breathing.

Many years of sad experience have emphasized the necessity for drastic treatment if the patient is to be spared a slow and distressing death. Several conclusions have been reached. They are that irradiation is ineffective; that limited operations, with preservation of the larynx, are very rarely effective; and that removal of the upper end of the oesophagus must be accompanied by excision of the larynx, with part of the pharynx. The complete operation should be performed at the earliest possible moment after establishment of a diagnosis, before the progressively infiltrating growth has further opportunities of spreading. The operation must be truly radical, with block dissection of glands, complete or partial according to distribution of the primary growth or metastases. And, finally, immediate restoration of the food passage should be attained, the method adopted being the introduction of a specially shaped tube of rubber or plastic material, covered with a split-thickness skin graft.

It is well recognized that strictures may subsequently occur, but their relief does not present undue difficulties if a suitable plastic operation is performed. Objections to radical operation have in the past been based on the immediate dangers, on the probability of recurrence, and on the loss of speech. Even if the drastic one-stage procedure advocated is adopted the operative mortality should be slight; the prospects of cure are sufficient to afford a reason for its performance. The possibility of speech is illustrated by the following case.

Case Report

A woman aged 46 at the time of operation five years ago was subjected to the method described; while retaining a plastic tube through which she swallowed, she led an active life and drove her motor-car vigorously. Stricture formation at the junction of skin tube and oesophagus required plastic repair, carried out by Mr. Moore, plastic surgeon to King's College Hospital. She now takes ordinary meals, although requiring a drink of water at times to assist the passage of food through the non-muscular skin tube. Lessons in speech education were given by Miss Swallow, but full credit must be given to the patient herself for her determined and prolonged efforts to talk, with so successful a result that she can converse freely and is easily understood even on a telephone. At a meeting of the Association of Plastic Surgeons in February, 1953, the patient was audible at the back of the hall (Negus, 1953).

Comment

Investigation of the mechanism of speech has been carried out by the method of Bateman, Dornhorst, and Leathart (1952). It appears, from the records obtained, that her speech is essentially similar to that after simple laryngectomy (Fig. 1), except that the production of sound is at the junction of skin tube and pharynx where the anterior and posterior walls fall together, and not at the level of the crico-pharyngeal sphincter, the latter having been completely removed at operation. Radiological examination while swallowing barium showed a sufficiently wide food passage at all levels; the narrowing visible in the film reproduced here (Fig. 2) seems to depend on contraction of the remaining fibres of the pharyngeal constrictor muscle, and offers no impediment to the passage of food. Although during normal breathing the oesophagus contained air, the narrowing was enough to prevent free oesophageal respiration, and, during the expiratory

efforts of speech, sufficient resistance was presented to outgoing air to allow the production of sound. The patient had an advantage over one with a simple laryngectomy in that no special knack of filling the oesophagus with air had to be acquired, and she herself said that all she had to do to make a sound was to attempt to shout.

It may be that the exact form of the graft which allowed sound production was a fortunate chance. Further patients will have to be examined to check this. If necessary, there should be no insuperable difficulty in imitating in others the anatomical features found in this patient.

We feel that the demonstration of efficient speech in this patient should be an encouragement to others, and an indication that with sufficient application the acquisition of a voice is a possibility.

We thank Dr. Gordon Gryspeerdt for radiological help.

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A PLASTIC SURGICAL DRESSING

BY

C. G. ROB, M.C., M.Chir., F.R.C.S.

AND

H. H. G. EASTCOTT, M.S., F.R.C.S.

Surgical Unit, St. Mary's Hospital, London, W.2

The rising costs of gauze and absorbent wool have stimulated a search for an alternative dressing for surgical and other wounds. The object of this paper is to record our experiences with a liquid plastic dressing ("nobecutane"), which is an acrylic resin dissolved in a mixture of acetic esters (Hogeman and Olow, 1953). This dressing has been the only covering for 200 clean surgical wounds.

Method of Application

At the conclusion of the operation, after the last skin suture has been tied, the wound is wiped clean and then dried with a dry gauze swab. The plastic is applied with a brush, a plastic applicator, or a spray. A film forms over the whole wound and dries in about three minutes; the patient is then ready to return to the ward. About 2 to 3 ml. of the liquid plastic has proved to be sufficient for the average abdominal incision. Provided that the wound is adequately covered, a thin layer is preferable to a thick one. We found the spray to be the most convenient method of application and the most economical. The plastic applicator provided a satisfactory alternative, but application with a brush was too wasteful, and with this method 10 ml. was required for an incision 6 in. (15 cm.) long.

The plastic forms an elastic, transparent, and adherent dressing which remains in position until the skin sutures need removal. It is then peeled off with forceps and the sutures are removed in the usual way. In some of our cases we applied the plastic to the skin of the operation site before operation and then operated through it, making a further application at the conclusion of the operation. This was unsatisfactory, because portions of the plastic film tended to flake away from the skin edge and fall into the incision.

Disadvantages

In the liquid state this plastic is inflammable, but not once it has dried as a film over the wound. It is painful

when applied to unanaesthetized raw surfaces. Absolute haemostasis is essential; oozing from the wound strips up the plastic film. When it is necessary to drain a wound a gauze-and-wool dressing should be applied to the area near the drain, but the rest of the wound can be dressed with the plastic. Another minor disadvantage is that the plastic will not adhere to a wet surface. The removal of sutures is slightly more painful than with a conventional dressing, as the ends of the suture may catch in the plastic; if a continuous skin suture is used this objection does not apply. At first we applied too much dressing, with the result that a thick film formed over the wound; we now use less of the liquid, and the film which results interferes very little with the removal of skin sutures.

Advantages

The dressing can be easily applied and maintained. If it wears thin or cracks a second application of the plastic spray can be made by the ward nurse. It is transparent; therefore the wound can be inspected with ease. It is permeable to air and water vapour but impermeable to bacteria; the wound does not become moist or macerated. The dressing can be washed with soap and water; this makes it possible for the patient to take a bath days before the sutures are ready for removal. It is flexible and strong, with the result that the patient can move freely not only the thorax and abdomen during respiration but a joint such as a hip, even when the incision crosses the joint line. In our experience patients with wounds dressed in this way are more comfortable than those with conventional dressings, and after an initial period of qualified scepticism our ward sisters prefer the plastic dressings. The dressing is not irritant, and only one of the 200 wounds in this series became infected; this settled rapidly after removal of the sutures. The solution has remained sterile in its bottle or spray container during routine use in the ward and operating theatre.

The plastic film is strong and capable of withstanding considerable strain; it has not fragmented or cracked before removal of the skin sutures in any of our patients, but we have used it only on in-patients. It has been found to be of special value as a dressing for wounds of such regions as the face or scrotum, where it is difficult to hold a gauze-and-wool dressing in position; but we use it as a routine for all clean surgical incisions. The plastic actually holds the skin edges together, with the result that tension is reduced and healing appears to be more satisfactory. We have not had the opportunity of applying the plastic to the skin near to an intestinal fistula, but it provides a satisfactory dressing for the incision near to a colostomy.

Of particular importance is the cost. This plastic sells at 0.84 of a penny per ml.—2½d. for the average abdominal incision. A gauze-and-wool dressing held in position by ½-in. (1.25-cm.) adhesive strapping also costs about 2½d. for a similar incision, but it has to be renewed at least once during each patient's stay in hospital. In our view the use of this plastic should reduce the cost of dressings for clean surgical incisions by at least 20%, and it saves the staff much time and trouble.

Conclusions

This liquid plastic appears to have advantages over conventional gauze-and-wool dressings and other plastic substances.

Its special advantages include easy application, cheapness, easy wound inspection, increased comfort for the patient, and less work for the nursing staff.

Its main disadvantages are that haemostasis must be complete, although time spent achieving this rarely harms the patient. Also, the removal of sutures is made more difficult if too thick a layer of plastic has been applied.

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SUXAMETHONIUM SENSITIVITY IN HEALTH AND DISEASE

A CLINICAL EVALUATION OF PSEUDO-CHOLINESTERASE LEVELS

BY

R. J. HAMER HODGES, D.A.

Consultant Anaesthetist

AND

JOHN HARKNESS, M.D., B.Sc.

Consultant Chemical Pathologist

(From the Anaesthetic Department, Portsmouth Group Hospitals)

Suxamethonium chloride (succinylcholine chloride; "scoline") has an established place among the synthetic compounds which have been introduced to produce muscle relaxation during anaesthesia. Immediate and absolute muscular relaxation, flexible and easily graduated effect, associated with rapid recovery and absence of secondary actions, satisfy many of the criteria of an ideal drug.

Disturbing reports have appeared, however, of unexpectedly prolonged action following therapeutic doses. It has been established that the drug is hydrolysed by serum pseudo-cholinesterase (Ps.ChE.), and Bourne *et al.* (1952), Evans *et al.* (1952a), and Bourne (1953) found low Ps.ChE. levels in the sera of patients showing delayed recovery. Bourne (1953) suggested that the dose should be regulated by body weight, citing the work of Thesleff (1952), and thought that in "frail" patients this dose should be reduced. Evans *et al.* (1952b) demonstrated an inverse relationship between this Ps.ChE. level and the duration of action of the relaxant, and later the same authors (1953) found that injections of a purified Ps.ChE. shortened this action. They advised against giving suxamethonium to patients likely to have a low serum Ps.ChE. level such as may be found in anaemia, liver disease, and after poisoning with insecticides and war gases. Lehmann (1952) thought that the use of the drug would be safe if these patients and those suffering from malnutrition were excluded from treatment. Macintosh (1953), however, found that undernourished and anaemic Asians showed no greater susceptibility to the drug.

During employment of suxamethonium in abdominal surgery, it seemed that the responses encountered, especially among anaemic patients, were not altogether in accordance with the suggested criteria. It appeared necessary to re-examine the clinical factors concerned. This investigation, therefore, was to consider the relationship between Ps.ChE. levels, body weight, and duration of action of the drug, and to determine whether exclusion from treatment of any particular condition, particularly anaemia, was warranted. This paper presents the association found between clinical fitness, Ps.ChE. levels, and suxamethonium sensitivity, and the conclusions drawn therefrom.

Material and Methods

The haemoglobin and Ps.ChE. levels were estimated in 114 patients (56 female, 58 male) from the adult surgical wards before operation. No selection was made except to exclude patients suffering from liver disease or clinical malnutrition, and, owing to technical difficulties, some emer-