bromothymol blue. We have confirmed this effect, which is small and most apparent at low levels of ChE, but it does not detract from the practical value of the test.

A disadvantage of the method is that the colour of the end-point (an olive green) is difficult to identify with precision, and in the case of low values the time at which matching with the standard tint occurs cannot be determined to within 5 or even 10 minutes; for clinical work this is not a serious drawback. The effect of variations of room temperature is small.

The test-paper method has the advantage that the plasma is undiluted, therefore if reversible inhibitors are present their effect is not diminished, as compared with *in vivo* conditions, as would be the case if the plasma were diluted as in other methods.

Ideally the ChE level of every patient receiving an injection of the short-acting muscle relaxant suxamethonium should be tested before the induction of anaesthesia. As the incidence of a low enzyme activity is only about 1 in 2,000 normal patients such a procedure would be impracticable. A familial incidence of this condition has also been noted (Lehmann and Ryan, 1956). Nevertheless, in the presence of liver disease and nutritional deficiencies (such as carcinoma of the oesophagus) a prolonged reaction to the relaxant occurs much more often; it is in such cases that the test will be found of greatest value.

Results with test-paper and with Michel's method. Normal values should fall within hatched area.

Summary

The test-paper offers a simple method for the estimation of plasma pseudocholinesterase, in which the plasma is allowed to act upon a substrate containing acetylcholine and bromothymol blue. The results with this method are in reasonably good agreement with those obtained from Michel's method, and although it is not a method of great precision it is suitable for routine clinical work. The value of this simple test in cases of liver disease and also in patients undergoing clinical anaesthesia with the use of the muscle relaxant suxamethonium is also emphasized.

We are grateful to Dr. H. Lehmann, of St. Bartholomew's Hospital, for his helpful advice in the preparation of this paper. Generous supplies of the test-paper "acholest" were kindly provided by the Österreichische Stickstoffwerke Aktiengesellschaft, Linz/Donau, Austria. The test-paper is now obtainable from Miles Laboratories Ltd., Nuffield House, 41-46 Piccadilly, London W.1.

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REFERENCES

- Aldridge, W. N., and Davies, D. R. (1952). *Brit. med. J.*, **1**, 945.
 Ammon, R. (1933). *Pflügers Arch. ges. Physiol.*, **233**, 486.
 Caraway, W. T. (1956). *Amer. J. clin. Path.*, **26**, 945.
 Herzfeld, E., and Stumpf, C. (1955). *Wien. klin. Wschr.*, **67**, 874.
 Lehmann, H., and Ryan, E. (1956). *Lancet*, **2**, 124.
 Limperos, G., and Ranta, K. E. (1953). *Science*, **117**, 453.
 Michel, H. O. (1949). *J. Lab. clin. Med.*, **34**, 1564.
 Rappaport, F., Fischl, J., and Pinto, N. (1959). *Clin. chim. Acta*, **4**, 227.
 Smith, R. L., Loewenthal, H., Lehmann, H., and Ryan, E. (1959). *Ibid.*, **4**, 384.

MARSUPIALIZATION OF BARTHOLIN'S CYSTS

BY

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Bartholin's cysts have been treated for many years by total excision and are still so dealt with in many clinics. This procedure is sometimes regarded as a minor gynaecological operation and simple to perform, but difficulties are often encountered in practice. Troublesome haemorrhage may arise; the cyst may be ruptured, causing difficulty in finding the correct layer of cleavage. The latter situation necessitates removal of the cyst and gland *in toto*. Obliteration of the remaining cavity is not always an easy task, and failure to do this can result in post-operative haemorrhage and delayed healing by second intention. The patient may suffer from painful scarring and discomfort. Loss of secretion may cause trouble should the opposite gland be malfunctioning—artificial lubricants are not always acceptable to the patient. When the cyst has been excised the recurrence rate is high and subsequent attempts to operate in a fibrosed area present considerable difficulties.

In the presence of infection, oedema of the surrounding tissues renders the dissection of the thick and friable cyst wall almost impossible, and if the surgeon enters the corpus cavernosum haemorrhage can be very severe indeed.

Excision of an abscess is therefore seldom undertaken while active infection is present; the delay in operating adds to the anxiety and discomfort of the patient.

Davies (1948) proposed a simple method of treatment of Bartholin's cysts aiming at restoration of the function of the gland. He treated 25 cases by incision close to the hymen in the region of the opening of the duct. The cavity of the cyst was then packed with iodoform gauze, which was removed and replaced twice weekly for three weeks. The packing was to prevent the small incision from closing and to permit epithelization of the new ostium with squamous epithelium. The method was not always successful, and there was difficulty in maintaining a stoma even with continuous drainage for several weeks, because retraction of the wall of the cyst occurred as the inflammation subsided, permitting union across the opening.

Jacobson (1950) described the simple operation of marsupialization with construction of a new mucocutaneous junction, and reported 19 cases showing good results. A second series of 140 patients who had 152 cysts with only four recurrences was reported later

(Jacobson, 1960). The results were excellent in all cases, including three of the recurrences in which marsupialization had to be repeated. The reason for the few recurrences which did occur was thought to be inadequate incision. After Jacobson's original report, Tancer, Rosenberg, and Fernandez (1956) reported 11 cases treated by marsupialization, all with satisfactory results, and Blakey (1958), in this country, treated eight cysts and six abscesses with complete success.

The satisfactory results obtained by these authors, by performing an operation which appears to be free of complications and unique in restoring the function of the gland, made us consider treating our cases the same way. The possible advantages were obvious and we were in fact rewarded with similar success.

Anatomical Considerations and Technique

Although the lesion is called Bartholin's cyst or abscess, it is in fact a cyst or an abscess of the duct of the gland. This structure is able to distend as it traverses the loose connective tissue between the gland proper and the ostium. The gland itself is a homologue of Cowper's gland and lies deep to the bulbocavernosus muscle and the bulb, on the deep transverse perineal muscle (Fig. 1). It cannot become cystic as it is surrounded by resistant layers.

FIG. 1

FIG. 2

FIG. 1.—Right Bartholin's cyst. Appearance of vulva before operation. FIG. 2.—Appearance at end of operation.

In treating our cases we used the technique described by Jacobson, and paid particular attention to the length of the incision. A vertical incision 1 in. (2.5 cm.) long was made direct into the cyst, immediately lateral to the hymenal ring. The lining of the cyst was then grasped with Allis's forceps in order to avoid retraction, and the cyst emptied of its contents digitally, all pockets being opened (Fig. 2). The cavity was then washed out with normal saline, and the edges of its lining were sutured to the adjacent cut skin margin. Usually six sutures were required, using fine catgut on an atraumatic needle.

Results

Twelve operations have been performed over a period of two years. One was carried out in the casualty department, under local anaesthesia, and the patient was discharged home two hours later. Three of the patients were pregnant, one 30 weeks and the other two 24 weeks.

Three of the patients presented with recurrent cysts following previous attempts at total excision on the same side. Two of those had been operated upon twice. All patients had negative Wassermann and Kahn reactions and gonococcal complement-fixation tests. An abscess was present in two cases and culture of the pus grew *Staphylococcus pyogenes* on one occasion and an anaerobic streptococcus on the other. Chronic cysts were found in the remaining cases. One of these cysts was filled with blood clot, and the rest contained yellow purulent material, which did not grow any organisms when cultured. Histology of the lining in this case showed it to be typical duct epithelium.

All patients were immediately ambulant post-operatively and received a saline bath twice a day for the first three days and thereafter once daily. They were discharged two days after the operation, except for the three pregnant patients, who were kept in for four days to relieve them of any anxiety with regard to the pregnancy.

The patients were examined six weeks post-operatively and thereafter every three months for a year. We found that the cavity and original opening had shrunk to a considerable degree by the first follow-up visit, and on each of the following examinations only the nose of a small sinus forceps could be inserted. The sinus remained very small, but was in no case occluded at the end of the year. There were no complications and no recurrences.

Discussion

Marsupialization of Bartholin's cyst has many advantages over excision. The operation is simple; complications and recurrences are rare. If need be, recurrence can be dealt with by repeating the procedure. There is no post-operative discomfort, healing is rapid, and the stay in hospital is brief. The physiological function of the gland is retained.

If desired, marsupialization may be performed on out-patients under local anaesthesia. The fact that the procedure can be carried out on an acute Bartholin's abscess is of particular value, as the abscess is drained and the curative operation performed at the same time.

For these reasons we no longer find any place for excision in the treatment of Bartholin's cyst.

Summary

Ten cases of Bartholin's cyst and two of Bartholin's abscess were treated by marsupialization with complete success.

The simplicity of this operation and its advantages over the excision of the cyst are discussed.

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REFERENCES

- Blakey, D. H. (1958). *J. Obstet. Gynaec. Brit. Emp.*, **65**, 802.
- Davies, J. W. (1948). *Surg. Gynec. Obstet.*, **86**, 329.
- Jacobson, P. (1950). *West. J. Surg.*, **58**, 704.
- (1960). *Amer. J. Obstet. Gynec.*, **79**, 73.
- Tancer, M. L., Rosenberg, M., and Fernandez, D. (1956). *Obstet. and Gynec.*, **7**, 608.

A revised British Standard Specification for pH scale (B.S. 1647:1961) has been issued. Copies may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London W.1, price 4s. 6d. each, postage extra to non-subscribers.