in hospital do not seem to respond to strapping. The cases of umbilical hernia I selected for injection had necks the smallest diameter of which was one-third of an inch or less. Most of the cases had been sent to me because strapping had failed.

Technique of Injection Treatment

An anaesthetic is not essential for young infants; a little ethyl chloride anaesthesia, however, is very helpful, because voluntary movements are controlled, but the sac still remains distended, so that it can be avoided. I have used up to 4.5 c.cm. of 5% phenol in almond oil at one injection. The solution is injected into the subcutaneous tissue as near the neck as possible without risk of puncture of the peritoneum. At a subsequent injection, if this is required, it is much harder to inject the solution. After injection it is essential to keep the hernia reduced. A small round pad of gauze is held in position by elastoplast applied right round the body like a belt at the level of the umbilicus. This support should be continued after the injections have ceased, because the scar tissue produced by the sclerosing fluid becomes more strain-resistant as time progresses. Animal experiments (Crohn, 1937) have shown that the phenol solution produces tiny areas of necrosis, which are later followed by more intense fibrous reaction than that seen when other solutions have been tried.

I would like to emphasize the method of applying elastoplast as a complete belt. Beadnell (1942) has suggested applying elastoplast to one half of the abdomen as far as the midline while the nurse pushes the other half of the rectus muscle towards the middle. Beadnell admits that his method produces a fold of skin in the midline, so there will be no effective antero-posterior support and very little pull on the two rectus muscles when the child cries or strains. The belt method of application keeps the hernia effectively reduced without any skin-chafing, and it will give much more support to the hernia owing to fixation from the lumbar spine. Mothers of babies with umbilical hernia nearly always state that they have noticed that the baby has cried less than before, and the belt method has certainly not reduced the baby's appetite or increased its liability to vomit. I strongly recommend this method of support, even for the youngest babies, as soon as umbilical hernia is noticed. The ordinary binder slips either up or down and it has to be removed daily for bathing, so the hernia is not kept permanently reduced.

Results of Injection Treatment

With ages ranging between nearly 3 months and 5 years, 42 out of a total of 62 cases of infantile umbilical hernia were selected for injection treatment and 63 injections were given. 26 cases needed only one injection; 11 cases had two injections, but two of these were submitted to operation later because the hernia showed insufficient diminution in size; 4 cases had three injections, and only 1 case had four injections, but this resulted in a cure. Out of the 42 cases selected for this treatment 31 were apparently completely cured when seen later, excluding the 2 cases cured by operation after unsuccessful injections; 2 cases were untraced, but it was not certain that the remaining 7 were finally cured, although when last seen they were responding well and there was very little umbilical bulge.

Subcutaneous Ligature

This minor operative procedure is recommended by Fraser (1926) for small umbilical herniae, and especially if they occur in slightly debilitated children who might not stand the radical procedure. The same author states that he has had no recurrence in hundreds of cases. Others, including myself, have not found this method so certain, because there has been a recurrence after an interval. It is probable that I would have found it more successful if I had combined subcutaneous ligature with a post-operative belt support.

Radical Cure

Most writers state that the radical method is the only certain way of curing umbilical hernia if the patient is over 3. It is required, however, for large herniae below that age. Barrington-Ward (1937) does not advise the Mayo type of repair, because there is no wide separation of the fascia, and yet he states that the recti are separated. It is curious that I cannot find any textbook which mentions that the hole in the fascia is

more often elliptical, with the long axis transverse; in fact, it can often be described as a transverse slit. Surely this shows that the Mayo type of closure of the fascia is better, just as it has proved better in adults. In children it is unnecessary to excise the umbilicus with an elliptical area of skin as in the Mayo operation for adults, because the hernia is reducible.

After opening the sac at its neck it is often possible to sew up the peritoneum separately. The aponeurotic opening is then closed by mattress sutures with overlap. The most difficult part of the operation is dissecting the fundus of the sac off the deep aspect of the umbilicus without buttonholing it or leaving a portion of the sac behind. My impression is that it is better to buttonhole the skin than to leave any endothelial lining, which predisposes to haematoma formation and sepsis in spite of drainage. Recently I have not drained the wound but have applied elastoplast as a belt after the operation. This procedure obliterates any dead space, and appears to have reduced the incidence of slight wound sepsis. Because of the danger of collapse of the lung Fraser does not recommend this operation before the age of 3. Apart from local sepsis, which delays convalescence, I have had no complications, although I will undertake operation in much younger patients if the hernia is large. I have performed the radical operation in 30 children, with two recurrent cases, during the same period as the cases that were selected for injection treatment.

Conclusions

Infantile umbilical hernia should be treated as early as possible with elastoplast applied as a belt with a small pad. After the age of 3 months the combination of injection and support will give a large percentage of cures even if strapping has failed in about two-thirds of the cases sent to the surgeon. Ambulatory treatment is desirable if possible in children, because of the frequent shortage of children's beds through infectious diseases and because of the risk of cross-infection. The injection treatment appears safe if done under short general anaesthesia.

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Medical Memoranda

Dienoestrol for Menopausal Symptoms

The chemical formula and physical properties of dienioestrol (γ -di-*p*-hydroxyphenyl- Δ^6 -hexadiene) were recorded by Dodds, Golberg, Lawson, and Robinson (1938), and Campbell, Dodds, Lawson, and Noble (1939). Zuckerman (unpublished communication), working on monkeys, found that dienioestrol when given by injection was much less potent than the naturally occurring oestrogens. Emmens (1938) found that when this compound was given to mice by mouth it had the greatest activity, relative to subcutaneous dose, of any oestrogen examined up to that time.

A clinical trial with dienioestrol was carried out by me (Barnes, 1942). The compound was used for the inhibition of lactation, and its effect for this purpose was compared with that of stilboestrol and hexoestrol. The results showed that when given by mouth dienioestrol is a potent oestrogenic substance, and inhibition of lactation was obtained with one-tenth of the dose required in the cases of stilboestrol and hexoestrol. It was clear that further clinical trials were desirable to establish the value of dienioestrol as an oestrogenic agent, and it was therefore decided to try its effect in relieving menopausal symptoms.

Hawkinson (1938) as a result of the study of 1,000 women who were undergoing a natural or artificially induced menopause found that 75% suffered from distressing symptoms, but that considerable relief could be given by the administration of naturally occurring oestrogens. This has been the experience of many workers, and it has been found that the synthetic oestrogens are equally successful in relieving the symptoms.

The results are not easy to evaluate, as the symptoms complained of are largely subjective. In the present series an attempt was made to follow the patients' progress by means of repeated vaginal smears, but, unfortunately, the records are incomplete in this respect, partly because the patients were erratic in their attendances at the clinic.

THE PRESENT INVESTIGATION

The clinical results obtained in this small series may be summarized as follows: A total of 13 patients received treatment with dienoeestrol, all for menopausal flushing or senile vaginitis. Two must be discounted, as they attended the clinic only once and were not seen again.

Of the remaining 11 five were having a natural menopause: one had had a surgical menopause for endometriosis at 38 years; two had had hysterectomy (presumably without removal of both ovaries) 14 and 15 years ago respectively; three had had a radium menopause. The symptoms and signs were: seven had hot flushes only; two had signs and symptoms of senile vaginitis; two had both conditions.

The results of treatment with dienoeestrol, using a dose of 0.1 mg. by mouth twice daily for one or more periods of four weeks, were as follows: Hot flushes relieved or cured, 7 cases; hot flushes slightly relieved, but responded better to stilboestrol (1 mg. twice daily), 1 case; hot flushes not relieved by dienoeestrol but cured by stilboestrol (1 mg. twice daily), 1 case. Larger doses of dienoeestrol would probably have been effective in these two cases. Senile vaginitis was relieved or cured in all the four patients treated for this condition.

As already mentioned, an effort was made to obtain objective evidence of the effects of treatment by means of serial vaginal smears. A smear was taken at each attendance—that is, every four weeks. In three patients the senile change was not sufficiently advanced before treatment was begun to say that there had been any change. In three others there was definite evidence of an oestrogenic effect, but in the remaining five the changes were too indefinite to warrant any conclusion.

All the patients were carefully questioned for toxic effects. None experienced nausea or vomiting. One patient had a slight vaginal haemorrhage. One other patient stated that the tablets "made her feel depressed," and she stopped taking them. Her hot flushes were subsequently relieved with stilboestrol.

CONCLUSIONS

It is unfortunate that it has not been possible to make these tests in a larger series of menopausal patients. The results obtained in this small group indicate, however, that dienoeestrol is a safe and non-toxic oestrogen; and it is to be hoped that it will be possible for other workers to carry out more extensive trials.

This investigation was carried out in the Obstetric Unit, University College Hospital, on behalf of the Therapeutic Trials Committee of the Medical Research Council. Pressure of other duties has prevented my testing dienoeestrol in a larger series of menopausal cases, and the present Memorandum is therefore published mainly as an encouragement to other workers to continue the tests.

I am indebted to Messrs. Boots Pure Drug Co. Ltd., British Drug Houses Ltd., and Glaxo Laboratories Ltd., for supplies of dienoeestrol.

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"Inspiratory Borborygmi" as a Sign of Diaphragmatic Hernia

The diagnosis of diaphragmatic hernia has been made with increasing frequency in recent years, and it has come to be recognized as a not uncommon cause of obscure respiratory and abdominal symptoms. The symptoms are, however, in no way distinctive, and signs are in many cases indefinite or entirely lacking. As a result these patients are often wrongly diagnosed, and may even be subjected to operations without the true nature of the condition being recognized. Harrington (1938) found that in a series of 123 cases of diaphragmatic hernia an average of 3 previous erroneous clinical diagnoses had been made, and operations for gall-stones and gastric ulcer had frequently been carried out without relief. Diseases of the thorax, abdomen, or blood (hypochromic anaemia) may be simulated, and for this reason diaphragmatic hernia has been termed the "masquerader of the upper abdomen." In a case recently under my care the diagnosis was suggested by a sign which I have not seen previously described.

CASE RECORD

The patient, a woman of 74, was admitted to St. Nicholas Hospital complaining of cough and dyspnoea. She gave a history of migraine from puberty to the menopause, and strangulated inguinal hernia 10 years ago. Apart from this she was well till 5 years ago, when she began to have attacks of cough and breathlessness lasting 4 to 6 weeks at a time and recurring about once a year. An attack was preceded by a grunting noise in her stomach which she felt with each breath. She also suffers occasionally from pain in the left chest and back. For the last 8 months she has been increasingly short of breath on exertion, and if she eats a big meal she has abdominal pain and a sense of suffocation, and has to sit down and rest for a time. Several days before her admission to hospital she noticed the usual grunting noise in her stomach. This was followed by vomiting and diarrhoea, and later by cough and dyspnoea. A few days after her admission the attack had passed off, but she complained of pain in her left chest passing through to the back. On examination she was found to be a fairly well nourished woman. She lay flat in bed and was in no obvious distress. A grunting, borborygmus-like sound synchronous with inspiration could be constantly heard coming from her abdomen during the examination. With the stethoscope this sound was found to be most readily audible over the left lower chest and epigastrium. It ceased when the patient held her breath or sat up. Physical examination, apart from some moist sounds at the bases of the lungs, was negative. The blood pressure was 160/85.

FIG. 1.—Antero-posterior view. Hernia can be seen lying behind lower part of heart shadow.

FIG. 2.—Lateral view. Hernia is seen to pass up into the posterior mediastinum in front of the oesophagus.

A barium meal revealed a shadow superimposed on the lower part of the heart shadow in the supine position (Fig. 1). In the erect position it was seen to empty during expiration and fill with barium from below at each inspiration. The hernia was observed to contain a portion of the cardiac end of the stomach and to be situated in the posterior mediastinum in front of the oesophagus (Fig. 2). It was therefore a para-oesophageal hiatus hernia, according to Akerlund's (1926) classification.

DISCUSSION

"Gurgling at the left base" has been mentioned in several accounts of the disease; but it is not diagnostic, as it is heard in many other conditions and in normal subjects by transmission of the sounds from the abdomen. Unless the gurgling sound is heard in the left side of the chest, is synchronous with respiration, and stops when the breath is held it is not diagnostic. The mechanism by which this sign is produced is simple. During inspiration the intra-abdominal pressure is increased. At the same time the pressure in the thorax becomes more negative. As a result gastric contents, both fluid and gaseous, are forced into the herniated portion of the stomach, so producing the gurgling sound. If in the upright position the fluid level in the stomach is below the opening into the herniated pouch, only gas will pass to and fro and so the sign will disappear, returning when the patient lies down again. I have not encountered this sign in any other disease.

Addendum.—A further case of diaphragmatic hernia in which this sign was present has since been encountered. This was also a hiatus hernia, but of the gastro-oesophageal type, the lower end of the oesophagus being pushed up through the hiatus as well as the fundus of the stomach. The sounds were best heard over the praecordium, the patient lying on her left side.

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