

estimate of proportion of errors has a fairly large sampling error. The expectations depend on the expansion of the binomial $(p+q)^n$, where p is the probability of obtaining a false result. Table III shows the reliability of the test with

TABLE III

No. of Rats Used	Error if all Animals Give Same Result	Repeat rate (One or More Animals Giving Divergent Results)
2	1 in 173	1 in 7.6
3	1 ,, 2,250	1 ,, 5
4	1 ,, 29,450	1 ,, 4
5	1 ,, 400,300	1 ,, 3.3

increasing numbers of animals if all the animals give either positive or negative results. In a high proportion of cases the answer will not be clear-cut in the sense that one or more animals give divergent results. In these cases a repeat test would be required and the repeat rate has also been calculated.

For most purposes a "two-rat" test would combine a sufficient degree of accuracy with a relatively low repeat rate. If a rapid answer is needed four rats should be used (Table IV). If all agree the chances of error are negligible,

TABLE IV

No. of Rats Used	Result	Chances of Error	Repeat Rate (Two or More Animals Giving Divergent Results)
2	AB	1 in 1	0
3	AAB	1 ,, 70	0
4	AAAB	1 ,, 5,536	1 in 32
5	AAAAB	1 ,, 42,750	1 ,, 19

and if one disagrees the chances of error for the remaining three are still only 1 in 5,500. The 3 to 1 ratio will occur with tolerable frequency, and only very few tests will have to be repeated.

This approach allows a more critical test when clinical urgency or importance warrants the added expense.

Summary

The rat ovarian hyperaemia test was carried out on 282 samples of urine. When one rat per test was used a slightly greater number of correct positive findings were obtained than with the Hogben test, but the rat test gave a considerable number of false-positive results. The single-rat test is unsuitable for clinical purposes. By increasing the number of test animals, however, any desired degree of accuracy can be obtained.

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Medical Memoranda

An Unusual Rectal Injury

The following rectal injury would appear to be so unusual as to merit recording in some detail.

CASE REPORT

A man aged 24 was admitted to hospital on November 5, 1953, complaining of severe abdominal pain of twelve hours' duration. He gave a history of a similar attack of severe pain six weeks previously, and stated that over the past ten years he had been subject to attacks of abdominal pain, lasting two to three hours, and sited around the umbilical region. The evening before admission he began to have diarrhoea, and passed both bright and dark red blood per rectum. Vomiting had occurred on the morning of admission. There was no previous history of melaena, and the bowels had been opened regularly each day.

On examination he was pale and collapsed; pulse 130. The abdomen was distended, with generalized tenderness and guarding, most pronounced in the lower half. The bowel sounds were absent; no tumour could be palpated. Per rectum, bright red blood was present in the anal canal. There was much tenderness, and a "doughy" feeling above the prostate which could have been caused by an intussusception, but exact palpation was not possible because of the great tenderness. Proctoscopy revealed copious fresh and altered blood, and a continual stream of faecal matter which made it impossible to visualize the anal canal or lower rectum.

Operation through a right lower paramedian incision, performed three hours after admission, revealed an extensive retroperitoneal extravasation of blood but no evidence of an intraperitoneal injury, though blood-stained fluid was present, together with considerable bruising of the mesentery of the small bowel in the region of the sacral promontory. The small and the large bowel were normal. In the absence of an intraperitoneal lesion the wound was closed. The rectum was again examined, and, now that the patient was anaesthetized and relaxed, a circular tear the size of a two-shilling piece was felt in the anterior rectal wall above the prostate. Blood clot and fluid faeces were present, and a considerable amount of bleeding was coming from this laceration. There was no evidence of injury to the anal or perianal regions, and the sphincter was of normal tone. It was now clear that this was a traumatic injury. A rubber tube was passed up the anal canal, through the laceration in the rectal wall, and into the perirectal tissues. Immediately there was a copious discharge of altered blood, together with a quantity of turbid and offensive fluid. The tube was sutured to the anal margin to keep it in position. A left inguinal colostomy was established and opened immediately.

Post-operatively the treatment was continuous gastric suction, intravenous fluids, penicillin, and streptomycin. In all, 5 pints (3.7 litres) of blood was given. The discharge from the rectal tube was copious for some days, and it was left in position for a week. Recovery was uneventful, and the patient left hospital nineteen days after admission. The laceration in the rectal wall could still be felt, but healing

was proceeding satisfactorily. He was readmitted a month later for closure of the colostomy. By now the rectal wound had healed. He was discharged after ten days with a normal bowel action; when seen for follow-up purposes six weeks later all was well.

COMMENT

The question now arose of how this injury had been inflicted. Many possible causes were considered, including the "compressed air" joke and some unnatural sex act, but none seemed to fit this particular case. When the patient was approached he first said he was standing too near a firework, and it had gone off while he was in a stooping position. When told this could not be so and he would have to tell the truth, he gave the following astounding explanation. For domestic reasons he had become unhappy and morose, and on the evening of November 4 he decided to explode a firework up his seat. He accordingly fashioned a narrow tube, using cartridge paper, and with the aid of a pencil introduced one end of this tube, approximately 6 inches (15 cm.) in length, into his rectum. He then placed a lighted firework into the end of the tube projecting out of his anus, with the result that a hole was blown through the anterior rectal wall. This escapade had taken place the evening previous to admission.

At first this story was accepted with reservations. What, for instance, happened to the firework—no charred bits were detected. Could a paper tube, even of stiff paper, be introduced into the anus against the action of the sphincter, and would there not have been some signs of singeing at least around the anal regions? However, there appeared to be no other reasonable explanation. He was referred to a psychiatrist, who stated there was no doubt this was indeed the true sequence of events.

The history in this case was grossly misleading, but had, of course, been made so deliberately. Had there been any suspicion of trauma to the rectum, examination under general anaesthesia would have been the first step.

A. G. BUTTERS, F.R.C.S.Ed.,
Consultant Surgeon, Beckett Hospital, Barnsley.

Ruptured Infected Urachal Cyst

This condition is rare enough to warrant the report of a single case.

CASE REPORT

A boy aged 16 was sent into hospital as an emergency case. The accompanying note from his general practitioner stated "appendicitis." The patient said he had always been perfectly well until ten days previously, when he noticed that about half-way through the act of micturition he developed lower abdominal pain of such severity that he was obliged to terminate the flow. This symptom persisted for four or five days, during which he was seen at another hospital; no abnormality, however, could be found. On the day before his admission the lower abdominal pain had become much more severe and was now constant. Micturition was still painful and there had been some diarrhoea. He had vomited several times.

On admission he was obviously ill, with earthen complexion and coated tongue. His temperature was 99° F. (37.2° C.) and pulse rate 92. The abdomen did not move on respiration and there was generalized muscle-guarding with rigidity across the hypogastrium. Tenderness appeared to be maximal in the right iliac fossa. Rectal examination revealed marked tenderness in the recto-vesical pouch. There were no bowel sounds on auscultation of the abdomen.

The history was a little strange and not typical of acute appendicitis. Clearly, however, he had peritonitis, and this appeared to originate from some condition in the pelvis. A pre-operative diagnosis of a perforated pelvic appendix was therefore made—on the grounds that "common things are commonest."

The abdomen was opened through a gridiron incision. There was much pus in the peritoneal cavity, but the appendix was normal. Further palpation revealed an extra-

peritoneal mass overlying the fundus of the bladder, with a finger-like prolongation extending upwards in the midline along the deep aspect of the anterior abdominal wall. The appendix was removed. A lower right paramedian incision was then made and the previous findings were confirmed. Omentum was adherent to the mass, and when this was separated an abscess cavity the size of a plum was opened from which pus and debris escaped. The situation of the mass and the midline upward prolongation from it made the diagnosis obvious: this was a ruptured infected urachal cyst. The pus was cleared away from the peritoneum and a drainage tube inserted through the gridiron incision to the abscess cavity. Both incisions were then closed. A cystoscope was passed and a little dimple, with a collar of mucosa around it, was seen in the roof of the bladder. There was no sign of any inflammatory process in the bladder.

Post-operative progress was satisfactory, both wounds being well healed by the tenth day. A specimen of pus from the abscess cavity contained mucoid material and numerous pus cells. No organisms were seen and no growth could be obtained on culture. A cystogram showed a normal bladder outline. Seven weeks after the operation the patient was in good health and symptom-free. No abnormality was detected on examination of his abdomen and rectum.

COMMENT

This subject was well reviewed by Brodie (1945), who included a survey of the literature up to that time. Apparently the earliest recorded case is attributed to Cabral in 1550. Urachal cysts are likely to be present in one of two ways: (1) the cyst may become large enough to cause pressure symptoms or to be discovered on routine examination of the abdomen; or (2) it may become infected and later rupture into the bladder, bowel, or peritoneal cavity, or a fistula may develop along the urachal track to the umbilicus. Other reported complications include tuberculous infection, calculus formation, and neoplastic change. Kantor (1939) believes that infection reaches the cyst by direct extension from the bladder along a narrow channel which later becomes obliterated by the inflammatory process. Others favour lymphatic or haematogenous routes. It is interesting to note that in a number of cases, including the present one, no organism has been cultured from the cyst contents.

All authors are not agreed on the method of treatment of the ruptured infected cyst. Some favour immediate excision and others preliminary drainage followed later by excision. A few suggest curettage and irrigation with silver nitrate. Callanan (1951) and Everett (1942) each report a case in which a ruptured infected urachal cyst was excised, together with adjacent bladder wall, at an emergency operation. In both cases histological examination showed the lining membrane of the cyst to be almost completely destroyed. Baldwin (1912), operating for incisional hernia four months after draining an infected urachal cyst, found no trace of the cyst. Kantor (1939) describes a case successfully treated by incision and drainage, and Gross (1953) reports five cases similarly treated. In four of Gross's patients no further treatment was necessary, but in the fifth a recurrence necessitated excision of the mass. It would seem reasonable, therefore, to treat these cases by simple drainage in the first instance. Excision would then be indicated only if there were further attacks of inflammation, if a fistula developed, or if a mass persisted in the abdomen. The likelihood is that the cyst cavity becomes obliterated after a bout of inflammation severe enough to cause its rupture.

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RAYMOND HELSBY, F.R.C.S.,
Senior Surgical Registrar, Sefton General Hospital, Liverpool.

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