Francis (1950) showed that there was an inverse relationship between the incidence of bovine tuberculosis and the death rate for human tuberculosis. He says: "One cannot help wondering whether exposure to tubercle bacilli in milk does not, after all, provide a protection against the more dangerous respiratory infection in later life." He discusses other evidence in favour of this view (Lichtenstein, 1924; Madsen *et al.*, 1942; Holm and Holm, 1945). The idea that bovine tuberculosis may protect against human tuberculosis is not new, and presumably formed part of the basis of vaccination with B.C.G. Our survey would appear to produce further suggestive evidence in favour of this idea. As stated, Town X has a higher tuberculin-positive rate than its neighbouring town of Ipswich, and the present survey seems to show that this is related to bovine infection. Town X, however, has a much lower rate for pulmonary tuberculosis. There are, of course, other possible explanations, as the two towns, although neighbouring, are not comparable in respect of size of population, industry, housing, etc. Nevertheless, it will be interesting to discover in future surveys what effect the abolition of bovine tuberculosis may have on the incidence of human tuberculosis.

This survey has made us think more about tuberculin-sensitivity rates in relation to bovine and human tuberculosis spread by milk. It seems to us that one infectious cow supplying milk to a dairy can infect many more children in a few months than an open case of phthisis can in a lifetime. The phthisical patient could perhaps achieve a similar disaster by spitting into T.T. milk. Possibly the very high tuberculin-positive rates quoted in the past (Hart and Wright, 1939; M.R.C. National Tuberculin Survey, 1952) were more a reflection on the milk supply than an indication of pulmonary tuberculosis in the community. Great care is necessary when interpreting tuberculin sensitivity rates of the past and present. It should not be assumed that a falling tuberculin sensitivity rate is necessarily an indication of improved human infection rates unless the part played by bovine tuberculosis can be reasonably assessed. Indeed, if the theory of the protection from bovine infection is correct, a falling tuberculin sensitivity rate can coincide with an increasing rate of pulmonary tuberculosis.

We hope the findings of this survey are a reflection of a murky past and will not recur. We are not entirely confident about this. It seems that even with milk that is pasteurized or from T.T. herds there are still ways in which milk infected with tuberculosis can be sold to the public. Although there is control over the milk and cattle there is no direct control over those who attend the cattle or "handle" the milk. There are records of severe and sudden epidemics of bovine tuberculosis in cattle caused by an attendant having bovine tuberculosis of the lungs (Nielson and Plum, 1940; Tice, 1944). Such epidemics can occur between the biannual tuberculin testing of herds. It also is quite possible for a milk-handler with pulmonary tuberculosis to infect the milk direct. It seems to us that the only real safeguard against bovine tuberculosis is a policy aiming at complete eradication of bovine tuberculosis in the cattle combined with the present policy of increasing T.T. herds and pasteurization.

In view of our recent experience we cannot believe Lethem's (1955) optimistic views that glands of the neck and infection with bovine tubercle are things of the past. Such a view seems premature.

Summary

An outbreak of bovine tuberculosis in a small town was traced to its source.

A tuberculin survey of the schoolchildren of the town showed that most of the younger children who had been infected had acquired their infection from milk.

A comparison is made of tuberculosis in this town and in the town of Ipswich, where the milk is "safe." Although this town has a higher tuberculin-positive rate

and relatively more non-pulmonary tuberculosis, there is evidence that it has far less pulmonary tuberculosis.

The theory that bovine tuberculosis may offer some protection against human tuberculosis is discussed as a possible explanation of these figures.

Where both bovine and human infection are known to occur, it is necessary to interview parents of infected children to help determine the source of infection.

The present safeguards against bovine tuberculosis are regarded as inadequate.

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ANTERIOR APPROACH FOR BILATERAL ADRENALECTOMY

BY

K. C. McKEOWN, M.Ch., F.R.C.S., F.R.C.S.Ed.
 Senior Consulting Surgeon, Darlington Memorial Hospital
 and Friarage Hospital, Northallerton

AND

A. GANGULI, M.B., B.S.
 Surgical Registrar, Friarage Hospital, Northallerton

During the course of radical gastrectomy for carcinoma of the stomach, in which the spleen and pancreas together with the entire stomach are dissected away *en bloc*, we have been struck by the magnificent exposure which a transverse approach gives to the adrenal glands. In the light of our experience in many such cases we have adopted the anterior approach for bilateral adrenalectomy. The approach is similar to that described by Aird (1955), but differs in certain important respects.

Technique

The patient, a female in this case, is positioned on the operating-table as for cholecystectomy, but with the gall-bladder rest only slightly elevated and placed at a lower level. The table is tilted head downward to about 10 degrees. After removal of both ovaries through a lower midline incision, the upper abdomen is explored by a curved transverse incision with its convexity upwards. The placing of the incision is illustrated in Fig. 1. After the abdomen is opened a self-retaining retractor of the Finichetti type is inserted.

The left adrenal gland is approached first, by cutting along the lateral leaf of the lineo-renal ligament. This incision is started 2 in. (5 cm.) behind and lateral to the spleen,

beginning at the lower pole of the spleen and going upwards and slightly medially. The incision is then curved downwards and medially so that a wide peritoneal flap can be reflected. If the peritoneum is incised too close to the spleen this membrane tears back into the organ, with consequent troublesome oozing from the damaged surface. The curved incision in the peritoneum enables the entire surface of the adrenal gland to be exposed. By retracting the spleen downwards and medially the adrenal gland comes into view with great facility. The fascial condensation along

FIG. 1.—Showing the curved nature of the abdominal incision with the laterally placed drainage-tubes inserted through separate stab wounds. The oophorectomy incision is also shown.

the lateral border of the adrenal gland is then incised so as to define the space behind the gland. This fascia is the upper prolongation of the perinephric fascia and consists of an anterior and posterior layer which combine with the upper pole of the kidney to enclose the adrenal gland in a triangular space (Fig. 2). By scissor dissection the veins entering the medial and inferior borders

FIG. 2.—A sagittal section showing the position of the right adrenal gland lying behind the subhepatic pouch. The gland is enclosed in a triangular space formed by the upper prolongation of the anterior and posterior portions of the perinephric fascia, and bounded below by the upper pole of the kidney.

The right adrenal gland presents no greater difficulty in its removal in spite of its deeper situation behind the subhepatic fossa. The peritoneum forming the posterior lining of the subhepatic pouch is incised lateral to the duodenum and above the upper pole of the kidney, so as to form a flap with convexity downwards. The flap of peritoneum is turned forwards and upwards to expose the anterior surface of the adrenal gland as it lies against the bare area of the liver. The fascia covering the lateral surface of the adrenal

gland is first incised and the posterior space behind the adrenal gland identified. The finger can then be inserted inwards above the upper pole of the gland into the space between the two layers of fascia enclosing the gland (Fig. 3). This prevents the adrenal from moving upwards, which it is rather prone to do. The anterior fascial layer is then incised transversely at the level of the upper pole of the gland, which then prolapses downwards and can be dissected out under direct vision exactly as on the left side. The abdominal incision is closed in routine fashion with small drainage-tubes, placed down to the adrenal fossae on either side (Fig. 1).

Discussion

This surgical approach presents many interesting features which make the operation both facile and atraumatic and differs in some respects from that described by Aird. The

FIG. 3.—Showing the incision in the fascia lateral to the right adrenal and the insertion of the finger into the space above the gland. This prevents its upward displacement.

curved nature of the incision allows of a very wide exposure very much greater than that attained by an incision of similar length but made in a straight line. This is because the lower portion of the incision is displaced downwards as a flap and wide exposure thereby attained. In many cases where the costal angle is narrow a transverse incision must of necessity be of limited length and does not give adequate exposure without cutting through the costal margins.

The site of the incision in the lateral leaf of the lienorenal ligament is of great importance in that, if this is placed too close to the spleen, tearing of this organ frequently occurs. The upper curved portion of the incision enables a peritoneal flap to be reflected medially so that the dissection of the left adrenal is done entirely under direct vision. Haemorrhage is insignificant and the gland can be removed complete with minimal trauma.

On the right side the important feature is to incise the fascia lateral to the adrenal gland and to insert the finger into the space above the upper pole of the gland. This space is formed by the upper prolongation and confluence of the anterior and posterior layers of the perirenal fascia. Once the finger has been placed in this position the gland is fixed and the anterior layer of the fascia can be incised with complete safety. The gland at once prolapses downwards and comes entirely under direct vision, thereby facilitating the securing of the vessels individually before they are divided.

In our opinion, this technique also has the advantage that the patient requires no change of posture whatever from the start of the operation to its completion. We have found that movement of the patient during this operation may cause alarming changes of the blood pressure, which at this stage is very labile.

One point which requires special caution is the extent to which the patient is hyperextended by the gall-bladder bridge. In view of the fact that the operation is usually being carried out because of multiple secondary growths, care must be taken not to cause spinal damage by excessive hyperextension.

There is little doubt that the anterior approach provides all that is desirable for easy complete bilateral adrenalectomy.

The anterior route is, however, contraindicated in cases where there are extensive peritoneal secondary growths or when marked portal obstruction is present.

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