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A METHOD FOR COLLECTION OF BILE IN THE CONSCIOUS SHEEP

By

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SJØLI, N. E. and R. BIRKELAND: *A method for collection of bile in the conscious sheep.* Acta vet. scand. 1977, 18, 221—226. — A method to collect bile directly from the hepatic duct is described for use in the sheep. The technique is a combination of the intestinal re-entrant cannulae and a catheter from the duodenal lumen to the hepatic duct. The cystic duct is ligated near its junction with the common bile duct. The catheter is fixed in the proximal visible end of the hepatic duct. One plastic cannula is fixed to the duodenum opposite to the opening of the common bile duct and the other is fixed in the same way about 15 cm posterior to the first one. The two plastic cannulae fixed together with a plastic tube serve as an extra-abdominal anastomosis. During the collection periods the bile duct catheter is passed through an opening in the wall of the connection tube into a collection bag that is fixed to the plastic cannulae. Between the collection periods the catheter ends in the lumen of the anastomosis.

collection bile; sheep.

During an investigation on chronic copper poisoning in sheep (Sjøli, not published), it became necessary to collect bile from the hepatic duct on conscious sheep. *Harrison* (1962) had previously described a method performed on conscious sheep where he used a gall bladder cannula.

In order to collect bile directly from the hepatic duct we found it necessary to work out a method combining the intestinal re-entrant cannulae (*Ash* 1962) and a catheter from the duodenal lumen to the hepatic duct. The present paper describes a technique whereby hepatic bile is collected directly from the hepatic duct. We feel that this method is easier to perform than the method of *Harrison*.

MATERIALS AND METHODS

Two ewes of Norwegian mixed breed were used. For catheterizing the common — and hepatic bile duct, a polyethylene catheter (Portex Limited) with external diameter 3.0 mm and internal diameter 2.2 mm, was used.

An external ring of the same plastic material was fixed to the main catheter 1 cm from its end within the hepatic duct (Fig. 1). The plastic cannulae were made of polyvinylchloride pasta and of the type described by Ash (1962). The two plastic cannulae were connected with polyvinylchloride tubes. Human urin bags (1500 ml) fixed to the plastic cannulae with two strings were used for the collection of bile. Anaesthesia was in-

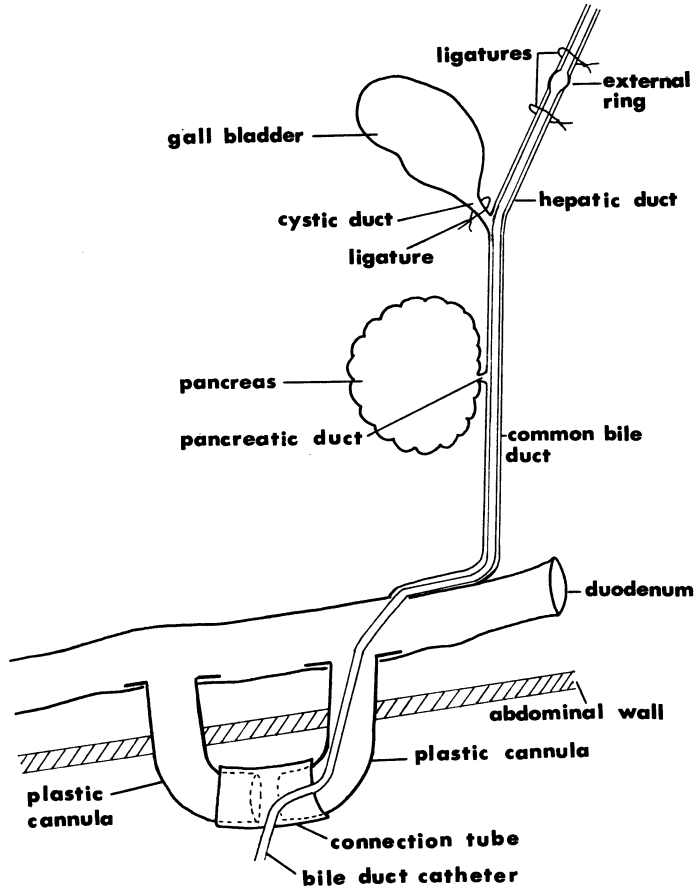


Figure 1. Diagram of the completed operative procedure.

duced with Thiopenton-Natrium (A/S Farmaceutisk Industri, Oslo) and after intubation continued with a halothane-nitrous oxide-oxygen mixture.

SURGICAL PROCEDURE

The sheep were deprived of food 24 hrs. prior to the operational procedure. A schematic diagram of the regional anatomy on opening the abdomen and retracting the viscera is presented in Fig. 2.

A paracostal incision was made on the right side of the abdomen about 3 cm posterior to the last costa. The common bile duct was traced into the duodenum and an estimate was made

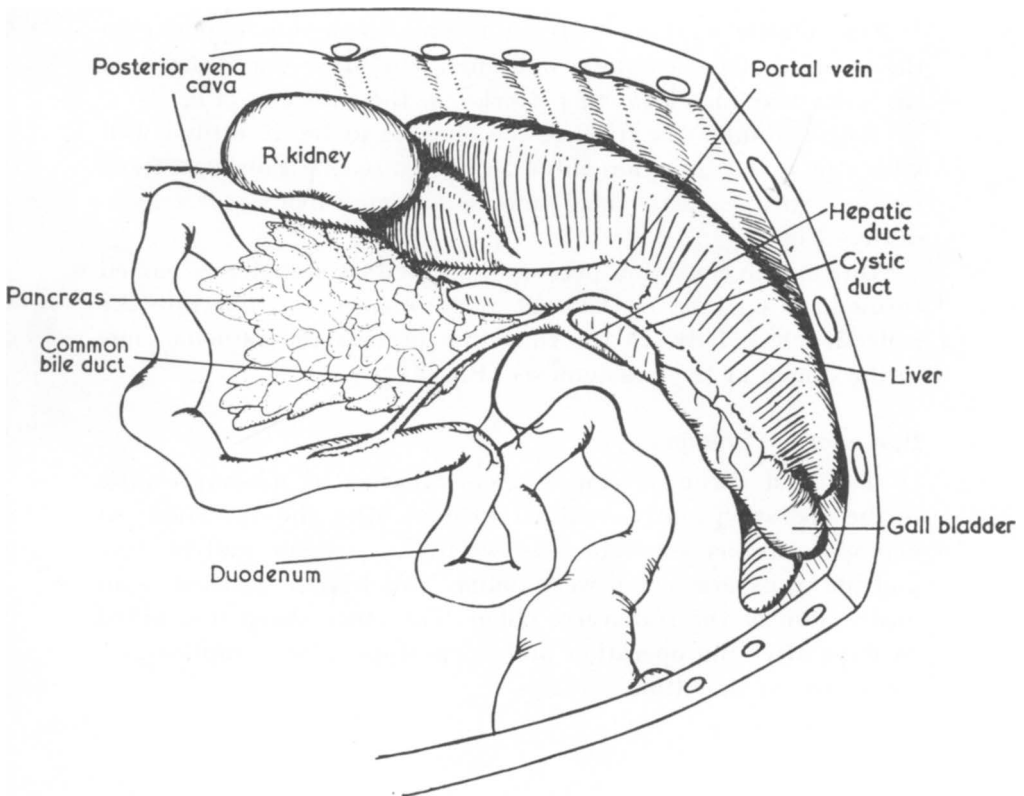


Figure 2. Diagram of the appearance of the pancreas and bile ducts on opening the abdomen and retracting the viscera (Taylor 1960).

of the position of the intraluminal opening of the duct (Fig. 1). An incision in the duodenal wall opposite to the anticipated location of the duct opening allows its precise localization. The common bile duct was cannulated and the contents of the gall bladder were removed through the catheter. The cystic duct was then ligated with a single nylon ligature near to its junction with the common bile duct and the hepatic duct. The catheter was then pushed further to the proximal visible end of the hepatic duct and fixed with one nylon ligature on each side of its external ring (Fig. 1).

In sheep the pancreatic duct joins the common bile duct. It is therefore important to use a catheter with an external diameter smaller than the internal diameter of the common duct to allow the pancreatic juice to pass between the catheter and the internal wall of the common duct into the duodenal lumen.

One plastic cannula is fixed to the duodenum opposite to the opening of the common bile duct. The other one is fixed in the same way about 15 cm posterior to the first one (Fig. 1).

Both cannulae are fixed to the opening in the intestinal wall with a purse-string nylon suture. The two plastic cannulae, fixed together with a plastic tube, serve as an extra-abdominal anastomosis (Fig. 3).

During the collection periods the bile duct catheter is passed through an opening in the wall of the connection tube into the collection bag. Between the collection periods the catheter ends in the lumen of the anastomosis (Fig. 3).

Post mortem changes

The first sheep developed an obstipation as a complication to the operation and was killed 10 days after the operation. At necropsy fibrous adhesences between the atrophic gall bladder and the transverse colon were found. This had in turn led to an obstruction of the transverse colon. The other sheep was killed 14 days after the operation and no postoperative complications were seen at that time.

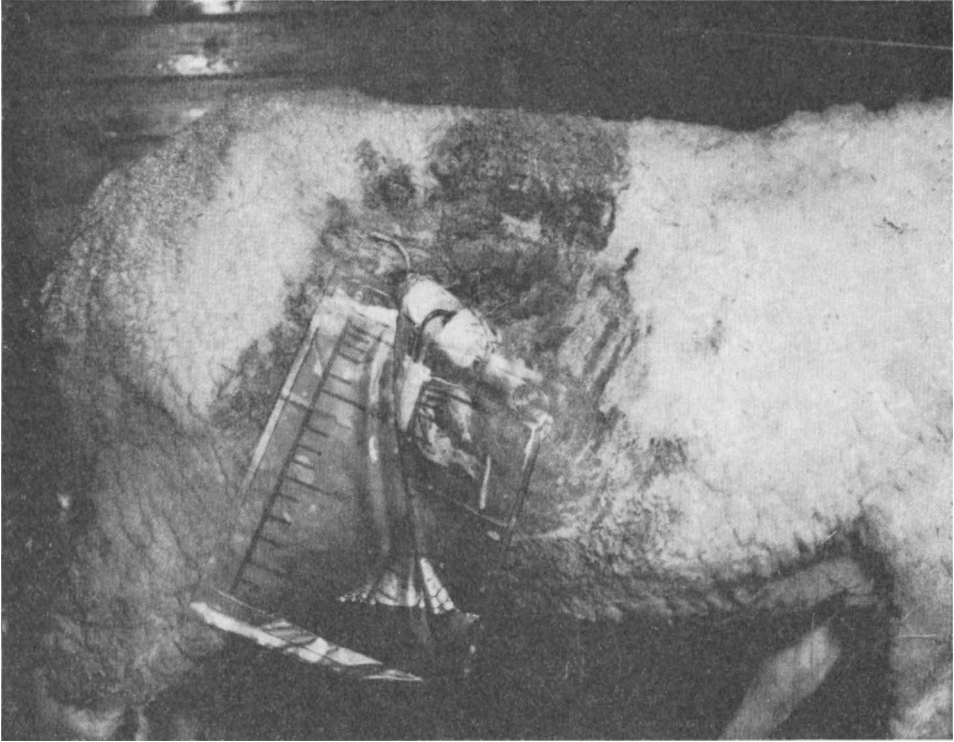


Figure 3. Photograph of operated sheep showing the extra-abdominal anastomosis and the collection bag.

DISCUSSION

By performing this operation it is important not to obstruct the pancreatic drainage into the duodenum. Therefore, a catheter with smaller diameter than the common bile duct must be used. The main hazard of this method is that relatively big particles in the bile may obstruct the catheter. This problem was not seen in the collection period but only in periods where the bile was returned to the intestine. It is, therefore, necessary in "the bile-return to intestine" period to check the opening of the catheter at least twice a day. If the catheter is blocked it is easily opened by aspiration with a 20 ml syringe.

In the collection period it is sufficient to empty the collection bag every 12th hrs. The bile volume can be measured, a sample can be taken for analysis and the rest can be injected back to the intestine through the plastic anastomosis.

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SAMMENDRAG

En metode til å samle galle fra ikke-anestisert sau.

En metode til å samle galle direkte fra ductus hepaticus på sau er beskrevet. Teknikken er en kombinasjon av en ekstra-abdominal tarmanastomose og et kateter fra duodenal-lumen til ductus hepaticus. Galleblæren ble tømt og ductus cysticus ble underbundet. Kateteret ble festet i den proksimale synlige ende av ductus hepaticus.

Den ene plastikk-kanylen ble festet til duodenum rett overfor gallegangens åpning, den andre ble festet til duodenum ca 15 cm lengre bak. De to kanylene som holdes sammen med et plastikkør, tjener som en ekstra-abdominal anastomose.

Under samleperiodene løper gallegangskateteret gjennom en åpning i veggen på forbindelsesrøret slik at gallen kan renne ned i samleposen som er festet til den ekstra-abdominale anastomosen. Utenom samleperiodene tømmes kateteret i lumen av anastomosen.

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