

A Method for Modeling Obturation of Extrahepatic Bile Ducts

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A model of extrahepatic bile duct obturation was developed in experiment on rats.

Key Words: rat; experimental model; obturation of bile ducts

Obturation or mechanical obstruction of extrahepatic bile ducts is a common complication of hepato- and pancreatoduodenal diseases, requiring surgical treatment. The apparent symptoms are yellow skin and sclera. This condition is sometimes called mechanical jaundice. The most frequent cause of mechanical bile duct obturation (or cholestasis) is complication of cholelithiasis.

The following experimental model is often used for study of the pathogenesis of choledochal obturation and for evaluating treatment efficiency. In rats laparotomy is carried out under general anesthesia and the choledochus is ligated at 2 sites by ligatures, after which the choledochus between the ligatures is crossed [3]. Another well-known method for modeling bile duct obturation in rats consists in ligation of the common bile duct at the site of its entry into the pancreas without cutting it [4].

A drawback of these experimental models is that they rule out the possibility of further recovery of bile flow into the duodenum, and hence, the animal status during the postdecompression period cannot be investigated.

Our method for modeling bile duct obturation in rats allows recovery of bile flow into the duodenum several days after experimental obturation and the study the body functions during convalescence.

The operation is carried out under hexenal narcosis: hexenal (5% water solution) is injected intraperitoneally (0.3 ml/100 g). After median laparotomy the liver is drawn upward and spread over the costal arch.

This opens an access to the portal, where the common bile duct is easily identified and ligated in the middle of the free area between the pancreas and portal. Then the choledochal wall above the site of ligation is notched with scissors and a catheter is inserted into the resultant hole towards the portal and fixed with ligatures. One more catheter, directed towards the duodenum is similarly inserted into the common bile duct. In another variant of the operation the second catheter is replaced with a tube inserted directly into the duodenum.

At the next step the catheters inserted towards the portal and duodenum (or the tube) are pushed (with a tube-shaped instrument) through pelvic soft tissues and then under the tail skin and brought out at a distance of 5-6 cm from the tail tip. A perforated sleeve is placed on the tail and fixed with a sharp pin [2]. External ends of the catheters are connected with a rubber muff, after which the bile starts flowing into the duodenum, as it did before the intervention.

After surgery the rat is kept in an individual open cage [2], where it is tied by means of a sleeve fixed near the tip of the tail. The tier sleeve is inserted into the vertical hole in the cage wall so as to allow its free rotation, which permits the animal move in the cage. The outside catheter (or tube) portions are situated outside the cage and are protected from being damaged by the rat with a special screen fixed on the cage wall.

Obturation of the common bile duct is carried out 7-10 days after surgery. To this end the muff connecting the catheters (or the catheter and tube) is removed and the ends of catheters are plugged. After development of pathological changes in the body (for example, after 3 days) the plugs are removed from the ca-

theters, the bile flow into the intestine is resumed, and then the dynamics of recovery is studied, including that during treatment.

Due to the fact that the catheters are placed outside the cage, all manipulations associated with obturation of the bile duct and subsequent resumption of hepatoduodenal bile flow do not disturb the animal and cause no stress.

This model of obturation can be also used for collection of bile samples in rats during chronic experiments. To this end, the catheters (or intestinal tube) are disconnected by removing the muff. The external opening of the catheter (or intestinal tube) inserted towards the duodenum is closed, while the free open end of the catheter inserted into the choledochus towards the portal fissure is put into the tube for bile collection.

The proposed biological model of obturation of extrahepatic bile ducts is adequate and permits the reproduction of all stages of the disease without repeated interventions and allows complete recovery of the bile flow into the intestine. We used this model in chronic experiments on rats with good results [1].

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