

RESULTS OF SURGICAL TREATMENT OF HYDATID LIVER DISEASE IN CHILDREN

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RELEVANCE

Echinococcosis (hydatid disease) — a life-threatening parasitological disease for humans and domestic animals. The disease spreads rapidly in children, which leads to profound morphofunctional changes in the affected organ [1, 2, 6]. Despite various antrum removal techniques (ART), recrudescence of non-parasitological cysts is observed in 4-20% of the medicated areas. Long-term complications associated with the ART occur in 8–14% of the medicated areas. There are 15 ARTs but the conditions under which these can be employed, such as accessibility and size of the echinococcal cysts (EC), remain unspecified. Peculiar complications arise when medium, big or large-size EC are centrally located in the subdiaphragmatic area of the liver. Due to erroneously chosen ART the rate of recrudescence after a subdiaphragmatic hydatid liver infection (SHLI) of the treated areas amounts to 5–12%. In addition there is a 7–46% rate of ulcerous or biliary intestinal fistula formation. [1, 3, 4, 6].

PURPOSE OF THE STUDY

To evaluate antrum removal techniques concerning the echinococcal cysts's location.

MATERIAL AND RESEARCH METHODS

Analysed were the results of studies and treatment of 153 children operated on because of hydatid liver disease in the past 15 years. 159 surgeries were performed on 153 patients. There were 35 children in the age group of 2–7 year-olds (35%), 51 (33.3%) 8 to 10-year-olds and 64 (43.9%) 11–15 years old children. 94 (61.5%) children had unicystic echinococcosis while the other 59 (38.5%) children suffered from polycystic echinococcosis. In 18 cases (11.7%) both liver and lungs were infected. 85.5% of the cysts were found in the right lobe of the liver and were distributed as follows: I — 12–4.1%; II — 14–4.8%; III — 17–5.6%; IV — 72–24.6%; V — 531–17%; VI — 48–16.4%; VII — 41–14.5%; VIII — 35–13.5%. At first the safest



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insight providing diagnostic methods were applied, such as ultrasound scan, x-ray of the chest from two different perspectives, radioisotope scan if required, CT, angiography and laparoscopy. It is particularly difficult to differentiate EC containing a multitude of smaller (daughter) cysts holding a small amount of liquid from liver formations. The following six ART were employed: employment of the catgut purse-string suture by Delbet's method (10); reduction of the fibrous capsule's (FC) volume by placing its edges on top of each other (5); coiling up the antrum's edges inwardly employing N.F. Berezkin's method and subsequently sealing reduced antrum with a duplicated gland on the vascular pedicle with A.T. Pulatov's method (13); sealing a lobe of the diaphragm to the bottom of EC located on the liver (9); reduction of the antrum's volume through invagination of the cyst (6) — a continuous catgut suture is made into the antrum and the FC's side walls through a thin layer of the liver parenchyma (and FC). Subsequently, the filament re-emerges while capturing the dissected edge of the FC. The next step is capturing the antrum's bottom. The other side of the FC is sewn the same way using the same thread, which leaves both ends emerged on the side wall of the AFC. Finally the dissected edges of the FC and a thin layer of liver tissue are invaginated and attached at the bottom of the antrum which makes them subside into the AFC and eliminates the antrum. Depending on the size of the EC, two or three invaginating sutures are necessary; AR with a cut lobe of the FC combined with a thin layer (up to 1cm) of the liver parenchyma on top of each other attached to each other and the bottom of the antrum (31). It should be noted that the

great gland appeared to be insufficiently developed in most cases (86.5%) to seal the antrum. In nine cases (12.1%) a drainage of the subdiaphragmal area was performed by machines such as the “cigar”, tamponade with the Mikulicz method, drainage by means of a duct and active aspiration of the antrum.

RESULTS AND DISCUSSION

Surgery performed on a patient infected with echinococcosis is built up of two parts. First — removal of EC, disinfection of the AFC and second — AR FC. To achieve these goals it is important to have sufficient supervision surface during the operation because both the FC and the serous antrum in which the affected organ is located need to be controlled frequently. Appropriate surgical approach considering size and location of EC on the liver allows to: decrease incidence of postoperative complications and, if possible, prevent from recrudescence because of undiscovered parasitic residues; reliably suture biliary fistulas and eliminate deep AFC. The surgical approach ought to be safe, provide an overview over the area the surgery is performed on and an appropriate access to the affected area of the liver. In case the EC is located in the subdiaphragmatic space (segment II, VI, VII, VIII) the most convenient ART is a continuous transverse laparotomy continued on VIII or IX intercostally in the pleura up to the mid-axillary line on the left or right by a cut from the rib arc to anterior axillary line. The next step is, depending on the chest type, the dissection of the cartilage VIII or the rib IX in the intercostal space up to the mid-axillary line which simultaneously dissects the intercostal muscles. At first, preserving the integrity of the pleural antrum, a piece of the peritoneum is cut open on the side of the abdominal cavity and the muscles of the diaphragm with the parietal layer of the pleura are pushed apart upwards which broadens the wound (Appropriate proposals no. 26 from 11.04. ‘Virpi, TIPPMK). As a result the depth of the wound decreases from 10 to 5–6cm and the vertical angle of vision increases from 40–45% to 100–110% while the horizontal angle of vision increases from 35–40% to 70–75%. Reasons to employ this ART were big or vast EC in segment VII-VIII that caused a raise or second relaxation of the diaphragm up to the II–III intercostal space. The patients receives additional lobes after the AR.

The reasons to operate horizontally from the upper part by dissecting straight or oblique abdominal muscles are if the EC is located in the bottom, front or side (segment I, III, IV, V, VI) surface of the liver. In doing so the EC, protruding from the liver tissue, is carefully fenced off by soaked in 96°-alcohol gauze tissue, leaving enough space for puncture. Now, the EC is

punctured and entirely emptied by means of a needle with rubber passage linked to a 20 ml syringe. Then the FC is dissected and its chitin shell removed. The AFC is disinfected with 96°-alcohol and loosely tamponated. The next immensely important step is the elimination of the AFC. The antrum is widely dissected, the biliary fistulas are sutured and the choice of the ART has to be made. In order to remove the antrums of centrally located medium, big and vast size EC located in the subdiaphragmal liver area we employed the ART of sewing lobes of the FC cyst (Appropriate proposal no. 41 from 8.04.2000 adopted Virpi TIPPMK). The FC and 1,5–2 cm of the liver parenchyma are dissected simultaneously parallel to the vessels which makes the top and bottom lobe of the FC form a semi concave surface. The goal is to easily suture the lobes of the FC to the antrum’s bottom. The resulting top and bottom lobe are dissected into two or three parts, depending on size of EC or AFC, of 1,5–2 cm in the liver parenchyma. Usually four to six FC lobes are created. Therefore the AFC can be opened to 1/2 or 1/3 of its surface which gives the surgeon a good overview and sufficient space to suture the biliary fistula. An eight-shaped suture and a polyethylene filament is used. It should be noted that after the removal of a centrally located medium, big or vast-sized EC by decreasing the pressure in the antrum’s wall the AFC’s walls contract in the depths of 2–3 cm. To prevent pathological accumulation of fluid or the formation of antrum are sewn together, which decreases its depth by up to 3–4 cm. The remaining antrum is 5–10 cm deep. It is eliminated by systematically suturing the lobes of the FC; to its wall, to its bottom and subsequently on top of each other. Thus, the antrum is entirely eliminated by suturing the contracted surface to the bottom of the FC and systematically attaching the FC lobes to the remaining AFC. Complications did not occur in the immediate postoperative period after the employment of the previously described ART.

In the immediate postoperative period three patients who underwent a laparotomy (2) with an additional broadening along the VIII intercostal space through the pleura to the mid-axillary line (1) suffered from a festering wound. Two out of three patients who were having complications with the postoperational wound were also having festering EC on the liver.

Altogether in 30% of the cases complications after the antrum removal occurred. Each of these had festering antrums that required another drainage. Two children also developed an inflammatory infiltration of the liver tissue which was confirmed by an ultrasound and caused by the disruption of the blood circuit and the drainage during the surgery. The patients each received two antibacterial and anti-inflammatory therapies.

Complications after AR by rolling inwards the FC edges with a thin layer of liver tissue with N.F. Berezkin's method were observed in four cases where medium or big-sized EC were located centrally in the form of the formation of an antrum (1), a biliary fistula (1) and a subphrenic abscess (4). In the postoperative period all of these patients suffered from hepatitis and liver failure even though neither of these symptoms had been observed before the surgery. These changes seem to have been associated with the deformation of the FC and liver tissue as well as with the blood circuit disruption and the development of the inflammatory infiltration and a hypoxia of the liver cells. One patient died of severe liver failure.

Complications after the AR by suturing a lobe of the relaxed diaphragm to the bottom of the antrum occurred in one case, in which the child suffered from partial pneumonia. The appearance of pneumonia is associated with the limited mobility of the diaphragm that was sutured to the antrum's bottom. This resulted in hypoventilation, disruption of the drainage process and the blood circuit in the lower part of the right lung.

Postoperative complications associated with the AR by invagination were observed in one case in form of an antrum in the subdiaphragmatic space which was caused by the remaining antrum between the liver and the relaxed diaphragm. Being aware of these problems, we subsequently started to apply diaphragmal duplication or removal of the relaxed diaphragm with individual corrugating seams. As a result of the diaphragmal duplication, 36 patients with a relaxed diaphragm did not require a drainage of the subdiaphragmatic area and no antrum formed.

Long-term consequences of the surgery were observed in 97 (63.3%) of the cases in the period of two years. U10-year-olds (10.3%), 21 two to five-year-olds (21.6%), 22 five to ten-year-olds (22.6%) and 44 children older than ten years (45.5%). Complications after a liver echinococcectomy after a long time period were observed in 12% of the cases.

Thus, the main causes of the complications was the inappropriate choice and low efficiency of the AR with Delbet's and N.F. Berezkin's methods or the lobe of the diaphragm which was the reason to abandon the previously described ARTs.

Duplication of the relaxed diaphragm reduces the space between the liver and the diaphragm which makes the drainage of the subdiaphragmatic area needless. An appropriate surgical approach when dealing with liver echinococcosis is an entire transverse laparotomy and, if required, additional widening of the wounds along the VIII or IX intercostal space up to the mid-axillary line. For small and medium-sized EC that are

peripherally located the ART is invagination of the FC into the antrum. For centrally located EC of medium, large and vast size the most effective way to remove the antrum is cutting lobes out of the FC cyst. In case of a relaxed diaphragm the duplication of the diaphragm employed.

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