The blunt abdominal traumas in children compose only 2–5 % of all traumas, and among them the blunt splenic trauma (BST) is about 66.6 – 90 %. Splenectomy causes a number of the severe immune complications. The problem of the immune function of spleen was discovered by King and Schumacher [8] in 1952, who informed about 5 cases of death of children as a result of sepsis after splenectomy. Splenectomy is accompanied by number of postoperative complications, the most serious is postsplenectomy sepsis, and mortality in this case may be 50–90 %. The risk of development of the infection depends on age of the patient – the greatest risk is found in children till 2 years of age, the danger decreases by age, but never disappears completely [6, 16].

For the last 30 years there were no significant changes in at traumas of GI or kidneys in children. But the treatment tactics at the BST has undergone cardinal changes; there was a tendency to avoid operations and use conservative methods. Ruptures in the case of BST seldom involve segment vessels, and at laparotomy the spontaneous arrest of bleeding is often observed. Conservative treatment includes a strict bed regimen, monitoring, nasogastric tube, the urine control, supporting of stable hemodynamics. The child stays 5–7 days in bed in ICU or surgical unit. In the presence of not-stable hemodynamics or symptoms of GI injury, operative treatment is necessary. The percent of conservatively cured children also considerably increases if aid is provided by children’s surgeons in specialized hospitals [2, 3, 9, 10].
of treatment of injured children under 15 years old with BST are presented. All patients have been examined and treated during the period from 1996 to 2016 in the Regional Children’s Hospital, Vladivostok, Russia. Totally for the 21-year period we observed 128 children with BST.

The isolated BST was found in 63 (49.2 %) children, polytrauma- in 65 (50.8 %), BST were more common in boys – 85 (66.4 %), in girls – 43 (33.6 %). Mean age was 10.6 years (1–14 years). Falls were the most frequent cause – 49 children (38.3 %). We observed seasonal prevalence – more often children were traumatized in a warm season: from April to September – 93 children (72.7 %) (Fig. 1).

Five (13.9 %) patients were operated on, two underwent laparotomy with splenectomy, three – splenorrhaphy (1) and partial splenectomy (2). There was 1 death in a hematologic patient due to the massive blood loss.

Last seven years (2010–2016) we have developed algorithm for BST patients, including US and laparoscopy, have determined indications and contra-indications to various methods of treatment (Fig. 3). At this period there were no splenectomy in case of splenic trauma. For this period 27 children, including 12 (44.4 %) – with isolated and 15 (55.6 %) – with a polytrauma were treated. During this period US was used in all (100 %) cases without false-negative results. DPL was not used, laparoscopy was used in 5 (18.5 %) children. Conservative treatment was successful in 22 (81.5 %) children; laparoscopic treatment was successful in 5 (18.5 %) children. There were no open surgeries and no lethal outcomes.

All data are presented in the table. The decrease in number of children for last years is probably connected with less traumatism at present comparing to the period of 90-s and the increase in polytrauma is due to diagnostic possibilities.

Results of treatment of children with the BST lead to thought on necessity of change of tactics for surgeons for this problem. The important role of spleen and possibility of organ-preserving treatment in children become those starting moments which force to emphasize the preservation of spleen or splenic tissue. According to the literature, the problem of anti-pneumococcal vaccination after splenectomy is insufficiently studied in Russia but abroad such practice is universal [13, 17]. In our department we recommend anti-pneumococcal vaccination (vaccine Pneumo-23) to children who underwent splenectomy or splenic partial resection in case of various diseases, and also traumas.

Thus, careful monitoring of hemodynamics and application of modern diagnostic methods have given the chance of considerable restriction of surgical activity in relation to children with BST in favor of conservative therapy which became a method of choice in our hospital. Indications to conservative treatment at children with the closed trauma of a spleen is stable hemodynamics in the
patient at presence to 350 ml of a free fluid in children younger 7 years old in abdominal cavity by US, absence of accompanying damages of GI which correlates to older publications [1, 4, 15]. In the follow-up observations we did not observe any cases of adhesive complications after the conservative treatment.

In a case when to avoid the laparoscopy and/or laparotomy impossibility, it is necessary to provide organ-preserving treatment. The presence of more than 350 ml of blood in abdominal cavity at stable hemodynamics is the indication to laparoscopy. At absence of a proceeding bleeding usually it is not necessary to do any manipulation except draining of abdominal cavity. Laparoscopy is often limited to survey and removal of clots sites of a spleen on all existing vessels can reduce conservative costs in conservatively treated and reducing post-operative pain in those who require LS. The fail of conservative treatment was found in 1 patient in the first period and total number of conservatively treated patients was 86, so the fail rate was 1.15 % which is the corresponds to level of centers using CT routinely [7, 11].

Table

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<tbody>
<tr>
<td>Isolated trauma</td>
<td>36 (55.4%)</td>
<td>15 (41.7%)</td>
<td>12 (44.4%)</td>
<td>63 (49.2%)</td>
</tr>
<tr>
<td>Polytrauma</td>
<td>29 (44.6%)</td>
<td>21 (58.3%)</td>
<td>15 (55.6%)</td>
<td>65 (50.8%)</td>
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Conclusions. Our experience shows that conservative and organ-preserving treatment for BST in children is possible even without CT with the stuff, experienced in US and LS. The cornerstone of the success is the possibility of monitoring and special intensive care department presence of pediatric ICU with good monitoring.

References


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