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SURGICAL TREATMENT OF NEONATAL OVARIAN CYSTS

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Summary – Medical experts are still at issue over the most suitable management of simple neonatal ovarian cysts exceeding 40 mm and complex cysts of any size. The authors present surgical treatment of these cysts by classical laparotomy and laparoscopy. The study included 13 newborn babies surgically treated for 6 simple and 7 complex ovarian cysts. The diameter of the cysts ranged from 29 to 102 mm. The age of children was from 2 days to 10 months. The open classical laparotomic approach was performed in 8 babies. In the laparotomy group, cystectomy was done in 3 infants with simple cysts. The other 5, presented with ovarian torsion, required salpingo-oophorectomy. Video – assisted cystectomy was the procedure for 3 simplex and one complex cyst with torsion. Laparoscopic adnexectomy was applied in one case with auto-amputated cyst. Our small study demonstrates that laparoscopy is as safe and effective as classical laparotomy in managing neonatal ovarian cysts, but with better cosmetic results.

Key words: Ovarian Cysts; Infant, Newborn; Infant; Laparoscopy; Laparotomy; Prenatal Diagnosis; Ultrasonography, Prenatal; Infant, Newborn, Diseases + surgery; Female

Introduction

Routine antenatal ultrasonography has increased the rate of detection of neonatal ovarian cysts. The first antenatal description of an ovarian cyst was made by Valenti in 1975 [1]. Ovarian cysts are the most frequent among intra-abdominal cysts in newborns [2]. The etiology of fetal ovarian cysts is not entirely clear. It seems that ovarian cysts arise from mature follicles [3,4]. The distinction between mature follicles and ovarian cysts is based on their size: those larger than 20 mm are considered pathological [5]. They could be usually diagnosed after the 28th gestation week (GW) [6]. Various complications of ovarian cysts may happen in perinatal period, such as adnexal torsion, intra-cystic hemorrhage and rupture. That could results in ovarian loss [2,7,8]. When a cystic abdominal mass is diagnosed in a female fetus and newborn, the differential diagnosis should be made for intestinal duplications, hydromeorrhiosis, mesenteric-, omental- and urachal-cysts, cystic teratoma, intestinal obstruction, choledochal cysts or only bladder distension [9].

Nussbaum classified ultrasonographic (US) patterns of ovarian cyst masses into simple (S) cysts, which are anechoic, and complex (C) cysts, which have echogenic wall, with the presence of fluid, debris, septae, or solid particles [2,10,11].

Symptomatic neonatal ovarian cysts and complex cysts should be removed regardless of their size [12]. There is still a controversy regarding treatment of asymptomatic simple cysts and no consensus has been reached so far. However, the majority of authors agree that cysts exceeding 40 mm should be surgically treated [2,8,10-12].

Until recently, the method of choice in management of infantile ovarian lesions was the conventional surgical approach. First laparoscopic procedures for gonad problems in pediatric patients were reported by Gans in 1973 [13]. This series and other reports have demonstrated that laparoscopic surgery is a safe and effective method to manage emergency and elective adnexal conditions in infancy [2,7,12].

This study, aimed at assessing the morphologic nature of these cysts and opting for the best surgical treatment, included 13 newborns and infants with antenatally diagnosed ovarian cysts.

Materials and Methods

The study was designed as a retrospective analysis of 13 baby girls with ovarian cysts, who had been treated surgically in the period from 2007 to 2009 at our institution (Table 1). All ovarian cysts were diagnosed ultrasonographically in the prenatal period after the 30th

Table 1. Patients operated for ovarian cysts

<table>
<thead>
<tr>
<th>Ovarian cyst/Ovarijalna cista</th>
<th>No of patients/Broj pacijenata</th>
<th>US* size/US veličina (mm)</th>
<th>Age (days)/Uzrast (dani)</th>
<th>Laparotomy/Laparotomija</th>
<th>Laparoscopy/Laparoskopija</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplex (S)</td>
<td>6</td>
<td>76.5 (55-102)</td>
<td>6 (2-14)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Complex (C)</td>
<td>7</td>
<td>53.4 (29-80)</td>
<td>56  (3-10 months/meseci)</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Total/UKupno</td>
<td>13</td>
<td>64.1 (29-102)</td>
<td>38  (2-10 months/meseci)</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

* US – ultrasonography/ultrasonografija

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**Results**

The surgery was performed through a transverse supra-pubic incision in 8 cases (Table 2). Three of them had simple cysts (S) with diameters 57 mm, 60 mm and 85 mm. Abdominal distension was present in two infants. These uncomplicated cysts allowed total or subtotal excision and conservation of most of the laminated ovarian parenchyma. The histological examination of all specimens showed ovarian cysts of functional origin. The operation revealed the absence of contra lateral ovary in one baby. Another 5 cases had complex (C) cysts, coloured dark brown, with diameter from 40 to 80 mm. Only one patient had signs of abdominal distension, intestinal obstruction and signs of RDS. They were operated on at the age of 3 days to 3 months. The surgery in one patient was done at the age of 10 months because the parents’ consent had not been obtained before; during that period there were no complications nor a decrease in the diameter of cyst. Ovarian torsion by 720° was found in two newborns. Detorsion and cyst extirpation and ooforectomy with salpingectomy together with intramural excision of the intramural part of the oviduct were done. Auto amputation was verified in three cases. One cyst, set behind the bladder, was found to be free. The other was connected to the opposite adnexa. In both cases, residues of fallopian tubes were present after torsion and auto amputation. During the surgery, the cysts were removed, with complete resection of the tubal stump, which was done in order to reduce the risk of ectopic pregnancy in the future. In the third infant we found auto amputation, cyst of the right ovary was fixed to the mesentery and the terminal ileum, leading to the complete ischemia of intestinal length of 15 mm. Therefore, in addition to removing the cyst, we made resection of ischemic bowel and anastomosis as well. Anastomotic and wound dehiscence, peritonitis and sepsis complicated the postoperative recovery significantly in this patient. Histological expertise of all five complex cysts indicated the hemorrhagic ovarian infarction, with more or less present calcification, without distinguishing the presence of ovarian tissue. Clinical and ultrasonographic follow up of these patients over the next 3 years, at the most, showed no additional complications, but with the presence of a visible scar.

**Table 2. Ovarian cysts treated by surgery - laparotomy**

<table>
<thead>
<tr>
<th>No</th>
<th>US-appearance</th>
<th>US-size (mm)</th>
<th>Clinical signs</th>
<th>Operative finding – Procedure *</th>
<th>Operative nalaz – Procedura</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Simple</td>
<td>85</td>
<td>Abdominal distension</td>
<td>Cystectomy right and left ovary undeveloped</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Simple</td>
<td>57</td>
<td>Distenzija abdomen</td>
<td>Cistektomija desno i agenezija jajnika levo</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Simple</td>
<td>60</td>
<td>No/Ne</td>
<td>Cystectomy lef/Cistektomija levo</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Complex</td>
<td>80</td>
<td>Abdominal distension. Intestinal obstruction, RDS**</td>
<td>Auto amputation right, extirpation, ileum resection, anastomosis/Autoamputacija desno, ekstirpacija, resekcija ileu-ma, anastomoeza</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Complex</td>
<td>55</td>
<td>Ne</td>
<td>Torsion levo, Salpingo-ooforectomy</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Complex</td>
<td>40</td>
<td>Ne</td>
<td>Torsja levo, Salpingo-ooforektomja</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Complex</td>
<td>55</td>
<td>Ne</td>
<td>Torsja levo, Salpingo-ooforektomja</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Complex</td>
<td>55</td>
<td>Ne</td>
<td>Torsja levo, Salpingo-ooforektomja</td>
<td></td>
</tr>
</tbody>
</table>

* US – Ultrasonography/ultrasonografija; **RDS – Respiratory distress syndrome/respiratori distes sindrom
Laparoscopic approach was performed in five patients (Table 3). There were three simple cysts (S), 55, 100 and 102 mm. All were operated during the first days of life. Aspiration, fenestration or deroofing and video-assisted, transperitoneal total or subtotal excision of the cyst with maximum preservation of ovarian tissue were performed in all these patients. All simple cysts belonged to the group of follicular cysts.

Video-assisted adnexectomy was performed in one patient, because of auto amputation of the fallopian tubes and cyst of the left ovary. A brown cyst was found in the right lower quadrant, connected to the coecum with the adhesions. After adhesiolysis and removal of cysts, the tubal abutment was completely resected. In another patient, who had a complex cyst, we found a cyst torsion of the left ovary, the presence of small amounts of greenish content in the abdominal cavity and adhesions to the surrounding organs. Detorsion and video-assisted cystectomy was done. Histological findings in these two children spoke in favour of hemorrhagic infarction, with no ovarian tissue present. The postoperative course in all laparoscopically operated patients was normal and their hospitalization was relatively short, uncomplicated. We followed them up for two years. The scars on the skin are practically invisible.

Discussion

Prenatal ultrasound scans now show many fetal ovarian cysts, with an incidence of 34% found in stillbirths. The etiology of these cysts is thought to be the consequence of maternal gonadotropin stimulation delivered through the placenta to the fetus. Due to a decrease in hormonal stimulation that occurs after birth, regression of simple cysts can be seen. Therefore, some authors use this conservative method in treating even larger cysts [2,14,15]. Simple ovarian cysts smaller than 40mm can be safely observed, their resolution can be followed by US examinations and the policy "wait and see" can be applied. However, minimal invasive laparotomy and principle "catch and suck" [24,25]. We did not use this technique in treating our patients in this study.

Complications of prenatal and postnatal ovarian cysts are rather frequent and their incidence ranges between 36% and 71% [16,17]. In our study, this incidence is a little higher than 50%, which corresponds to the data found in literature. A complication such as an auto amputation of ovarian cysts in infants under 1 year of age is extremely rare [18,19], although in our series of 13 patients, auto amputation happened in 4 cases. Torsion is the most common complication because the newborn ovary has a long pedicle. Torsion is more common in larger cysts, exceeding 40 mm, when surgical treatment is indicated [12]. The outcome of torsion may appear as adhesion of necrotic ovary to the bowel or other organs, with possible intestinal obstruction, which was found in one of our patients. These and other complications, such as intestinal perforation, peritonitis or urinary obstruction, not only justify but require surgical treatment for all complex ovarian cysts, of all sizes, which was and still is our current protocol. Torsion has been observed to occur more frequently during fetal life than postnatally. For this reason, prenatal aspiration of these cysts has been used as a prevention by some authors [11]. However, as hormonal effect is still present during the antenatal life, the efficacy of these aspirations as a treatment has not been proved yet [20,21]. Therefore, our patients were not treated antenatally by cyst aspiration.

The most suitable management of ovarian cysts during the neonatal life is still an issue widely debated. Some surgeons still do echo-guided transperitoneal cyst puncturing as an alternative to surgery, without any complications [8,15,22]. According to others, these punctures should not be done because of a higher possibility of cyst refilling, leaking of its content and the resulting peritonitis, and also due to the danger of wrong or "blind" puncture which can have fatal outcome [23]. In addition, since echography cannot establish whether the lesion is benign or malignant, it is never advisable to puncture a cyst prior to the visual examination; therefore, we have not done that [17].

Until recently, most authors recommended the traditional surgery via an open lower abdominal laparotomy in patients with ovarian cysts, which is also presented in results section of our study. Some works have been published showing a safe and definite treatment of ovarian cysts larger than 40mm by minimal invasive laparotomy and principle "catch and suck" [24,25]. We did not use this technique in treating our patients in this study. More recent studies have described the use of laparoscopy in treatment of ovarian cysts [9,14,15,17,19,26], and this method is mentioned in the second part of our study. The major advantage of laparoscopy is the possibility to examine the cyst much better, which is crucial for the evaluation of lesion. Furthermore, this method also enables the examination of the entire ab-
dominal cavity and all its organs. Owing to the technological development which has resulted in a very small size of instruments, a really minimally invasive surgery can be done using trocar and instruments with diameter of only 1.7 mm, 3 mm and 5 mm, at the most. Intraperitoneal cystectomy is a method of choice, whenever it is possible with preservation of the ovarian tissue. In cases when dissection is difficult, transparietal cystectomy or excision of cyst can be done. We often used this method as the so called "video assisted" procedure after aspiration and fenestration ("deroofing"). Contrary to open surgical procedures, laparoscopic treatment of ovarian cysts ends in only three punctiform scars, which give a satisfactory cosmetic appearance for the entire life. Formation of adhesions and a danger of developing life threatening complications, which can result from a conservative treatment, do not occur when minimally invasive surgical techniques, such as laparoscopy or classical laparotomy, are performed [11,27-29]. The postoperative follow up for three years, at the most, did not show complications of any kind.

Conclusion

The choice of the method of treatment depends on the size and ultrasonographic appearance of the cyst. In order to achieve the optimal ovarian preservation and prevention of complications, surgery is justified in cases of simple cysts larger than 40 mm, and all complex cysts, because it allows a definitive diagnosis, evaluation of the condition of the ovary, the separation of inflammatory adhesions, removal of ovarian cysts and ovarian detorsion, as it has been confirmed by our study.

We conclude that laparoscopic technique, contrary to the traditional laparotomy, is safe and reliable for treatment of ovarian cysts in the neonatal period. Laparoscopy is a minimally invasive procedure with excellent cosmetic results.

References

Sažetak

Ključne reči: Ovarijalna cista; Novorođenče; Odojče; Laparoskopija; Laparotomija; Prenatalna dijagnostika; Prenatalna ultrasonografija; Oboljenja novorođenčeta + hirurgija; Žensko

Uvod

Za sada nema jedinstvenog stava o optimalnom lečenju neonatalnih jednostavnih ovarijalnih cista većih od 40 mm i komplikovanih, bilo koje veličine. Autori prikazuju hirurško lečenje ovakvih cista putem klasične laparotomije i laparoskopskim pristupom.

Material i metode

Studija je uključila 13 novorođenčadi i odojčadi, koja su hirurški lečena zbog postojanja 6 jednostavnih i 7 komplikovanih cista. Veličina cista bila je u opsegu od 29 do 102 mm. Uzrast dece se kretao između 2 dana i 10 meseci. Laparotomija je urađena kod 8 pacijenata, a kod 5 je primenjena laparoskopska procedura.

Rezultati


Zaključak

Ultrasonografija je metoda izbora u dijagnostici neonatalnih ovarijalnih cista. Naša studija pokazuje da visok rizik od gubitka ovarijuma potvrđuje neophodnost hirurškog tretmana neonatalnih jednostavnih cista većih od 40 mm i svih komplikovanih cista. U odnosu na klasičnu laparotomiju, laparoskopska nudi jednak siguran i koristan način lečenja ovarijalnih cista ali sa boljim estetskim rezultatima.