

# Ovarian cysts in infants: Indications for intervention and advantages of the minimally invasive method

Martin L van Niekerk, MB ChB, MMed, FCS (SA)

Department of Paediatric Surgery, University of Pretoria

**Introduction.** The incidence of diagnosed neonatal ovarian cysts has increased markedly with widespread use of ultrasonography. This article describes a laparoscopic approach to the management of 11 infants with large ovarian cysts at the Kloof MediClinic hospital in Pretoria. The single-port technique was used; 7 patients underwent laparoscopic salpingo-oophorectomy for necrotic ovaries due to torsion, and 4 underwent deroofting of uncomplicated cysts.

**Aim.** To review the clinical indications for surgical intervention and results of the minimally invasive technique used for infants with large ovarian cysts.

**Patients and methods.** This is a retrospective review of the medical records of infants who underwent laparoscopic intervention for an ovarian cyst between 2004 and 2008.

**Results.** Between 2004 and 2008 laparoscopic surgery was performed on 11 infants with ovarian cysts. In 7 cases torsion was already present, which necessitated salpingo-oophorectomy. Four patients had uncomplicated cysts which needed only to be deroofted. There were no complications, and all patients were discharged on the second postoperative day.

Brandt and Luks<sup>1</sup> cited Valenti (1975) as describing the first diagnosed antenatal ovarian cyst. Since then there has been an increase in the frequency of diagnosis because of improvements in ultrasound diagnostic technology. Small follicular cysts were found in 34% of autopsies of female stillborn infants.<sup>2</sup> Neonatal cysts are thought to be the result of stimulation of the fetal ovary by placental chorionic gonadotrophin, causing follicular dysgenesis.<sup>3-5</sup> Because of the decrease in hormonal stimulation that occurs after birth, ovarian cysts, especially small ones, generally regress spontaneously.<sup>6,7</sup>

Complications may occur in the perinatal period, the most frequent being adnexal torsion and haemorrhage in the cyst. This may occur *in utero*.<sup>8,5</sup>

There is no consensus concerning the optimal management of ovarian cysts in infants. The appearance of a complex cyst (debris) on ultrasonography indicates torsion, and intervention is mandatory. Intervention is also indicated for large (>4 cm) simple cysts because of the presumed risk of complications.<sup>9</sup> We describe our experience with the laparoscopic management of 11 patients with complex and large simple cysts.

## Patients and methods

Between 2004 and 2008 we performed laparoscopic surgery for ovarian cysts in 11 infants at the Kloof MediClinic hospital, Pretoria. All the cysts were diagnosed in the third trimester of pregnancy. The diameter of the cysts ranged from 4.2 to 7 cm (Table I).

There were 4 complicated cysts with ultrasonographic features indicating the presence of debris and septa. Scans showed the rest to be echo-free, simple cysts.

Nine of the infants were operated on in the first week after birth. Of these 5 had torsion of the ovary, which necessitated its laparoscopic resection. Four infants had uncomplicated cysts which needed only laparoscopic deroofting with careful preservation of the ovarian tissue. Two infants were only referred to us 6 weeks after delivery. Both had developed

TABLE I. OVARIAN CYSTS DIAGNOSED IN THE THIRD TRIMESTER OF PREGNANCY AND TREATED LAPAROSCOPICALLY AT KLOOF MEDICLINIC HOSPITAL, PRETORIA

Patient	Size of cyst	Referral	Type of cyst	Method of treatment
1	7 cm	Age 6 weeks	Torsion	Salpingo-oophorectomy
2	4.5 cm	At birth	Uncomplicated	Deroofting
3	6.7 cm	At birth	Torsion	Salpingo-oophorectomy
4	4.6 cm	At birth	Torsion	Salpingo-oophorectomy
5	6.1 cm	At birth	Uncomplicated	Deroofting
6	5 cm	Prenatal	Torsion	Salpingo-oophorectomy
7	4.3 cm	At birth	Uncomplicated	Deroofting
8	4.2 cm	At birth	Torsion	Salpingo-oophorectomy
9	5.1 cm	At birth	Uncomplicated	Deroofting
10	6.5 cm	Age 6 weeks	Torsion	Salpingo-oophorectomy
11	5.7 cm	At birth	Torsion	Salpingo-oophorectomy

torsion of the ovary after birth, which required laparoscopic oophorectomy.

## Procedure

A single-port technique is used. The baby is positioned in the supine position. A 3 mm camera port is placed through the umbilicus using the Hasson method. A pneumoperitoneum is

established with a pressure of 6 - 8 mmHg and a CO<sub>2</sub> flow of 3 l/min. A 3 mm 0° lens is placed through the camera port to visualise the ovarian cyst. A 19G spinal needle is inserted low down in the left or right iliac fossa into the cyst. The content of the cyst is then aspirated (Fig. 1). If debris is present it is not always possible to aspirate the cyst, and a 3 mm suction apparatus is used. A small stab incision is made through the abdominal wall after removal of the needle. A 3 mm Babcock forceps is inserted through the stab wound and the aspirated cyst is pulled to the outside (Fig. 2). In the case of a simple cyst, deroofing is done with careful preservation of ovarian tissue. If torsion is present, salpingo-oophorectomy is done. Vicryl 4.0 is used to close the umbilical and stab wound incisions. The skin is closed with Dermabond (Johnson & Johnson).

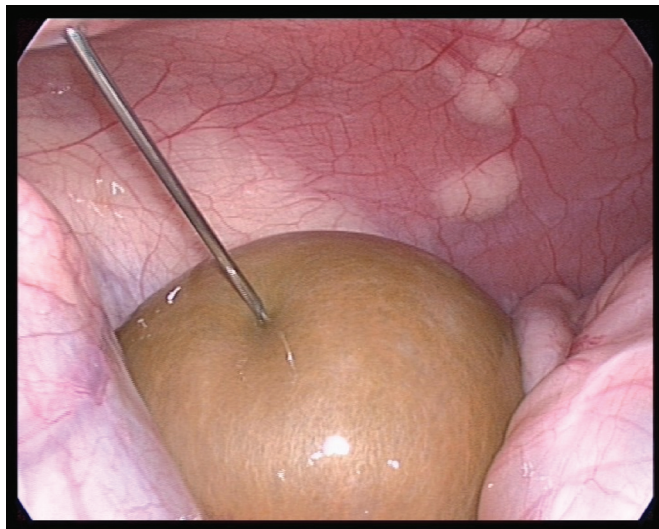


Fig. 1. Needle aspiration of necrotic ovarian cyst under laparoscopic vision.

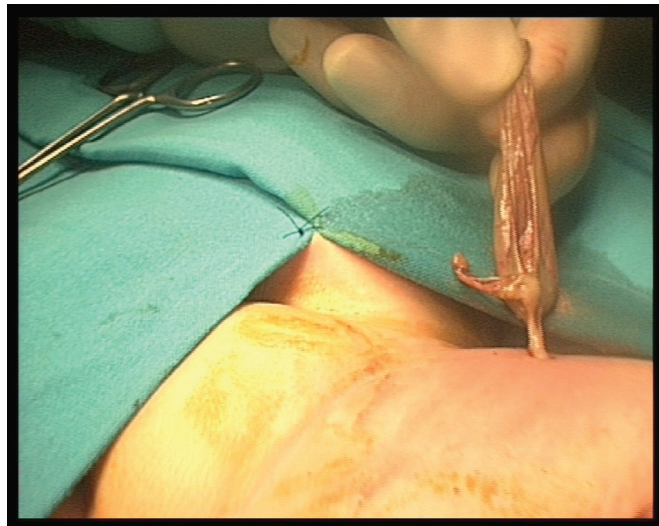


Fig. 2. Necrotic cyst and ovary pulled to the outside through small stab wound.

## Results

- The mean operating time was 34 minutes.
- Oral feeds were started 4 hours postoperatively.
- There were no complications, and all patients were discharged on the 2nd postoperative day.
- There were no recurrences on postoperative ultrasound scans after 6 weeks.

## Discussion

Neonatal ovarian cysts are usually follicular and almost never malignant. On the basis of ultrasonographic features, cysts are divided into two types: simple, which are completely echo free and have perceptible walls, and complex, with ultrasound features such as debris-fluid levels, septa or a retracting clot which indicates torsion or haemorrhage of the cyst.<sup>10</sup>

Most simple cysts measuring less than 4 cm do not develop complications and resolve within the first 6 months as hormonal stimulation decreases.<sup>5</sup> Antenatal torsion occurs in 20 - 32% of cysts.<sup>11</sup> Other complications are an abdominal mass leading to respiratory compromise, haemorrhage, peritonitis and bowel obstruction. These complications occur mainly in cysts measuring >4 cm. However, the 4 cm threshold does not preclude complications, especially torsion.

There is general agreement that intervention is required for complicated cysts and simple cysts measuring >4 cm, to prevent complications.<sup>8</sup> Only small echo-free cysts should be treated expectantly with close clinical and ultrasonographic follow-up. The incidence of torsion with loss of ovarian tissue is high (64%); the latter is mainly due to intra-uterine torsion already present on the first ultrasound scan. Two patients with uncomplicated (>4 cm) cysts on ultrasound examination at birth were only referred 6 weeks later for intervention. By this stage both had torsion of the adnexa, and the ovary could not be saved. Medico-legal implications in one case suggest that early consultation with a paediatric surgeon is of great importance when a cyst is diagnosed. Timely surgical intervention is necessary for large, uncomplicated cysts and should take place within the first few days after delivery to prevent loss of ovarian tissue.

Historically neonatal ovarian cysts were treated by laparotomy. Currently some advise ultrasound-guided aspiration for large simple cysts.<sup>3</sup> This approach avoids general anaesthesia, but is not definitive. Careful ultrasonographic follow-up and repeated aspirations may be necessary, which increases the possibility of bleeding and infection in the cyst. Aspiration of cysts should preferably be done when there is no doubt about the radiological diagnosis. However, diagnosis of the origin of the cyst is not always clear; the differential diagnosis includes choledocal, mesenteric, urachal and enteric duplication cysts, hydrometrocolpos and lymphangioma.<sup>4</sup> A cyst shown on ultrasound scan to be echo free can sometimes be necrotic.<sup>4</sup> A laparoscopic procedure eliminates this uncertainty. It also enables the surgeon to visualise the contralateral 'normal' ovary, and prevents possible damage to adjacent organs. The author therefore concurs with Schenkman *et al.*<sup>12</sup> that laparoscopic treatment is indicated for all large cysts.

One of our patients, diagnosed with a simple cyst on an antenatal ultrasound scan, had developed a torsion by the time she was operated on directly after birth. This patient might have benefited from intra-uterine aspiration of the cyst.

Improvements in paediatric anaesthetic care and the increased popularity of minimally invasive surgery have lowered the threshold for minimally invasive intervention, and this has become the method of choice for the treatment of ovarian cysts when indicated. Minimally invasive surgery is tolerated well by infants, even premature ones. It avoids adhesion formation, which is an important factor in future fertility. The cosmetic advantage with this

approach is obvious. With the visualisation provided by the laparoscopic camera it is possible to examine the other ovary and the whole pelvic area for coincidental pathology, i.e. inguinal hernias.<sup>13</sup>

Salpingo-oophorectomy was necessary in all our patients with complicated cysts. It was not possible to salvage any ovarian tissue in these cases due to necrosis. Deroofing of simple cysts was done with careful preservation of ovaries.

We developed a single-port technique, which is technically simple and cost effective. The cosmetic result was excellent because only a 3 mm umbilical incision and a 3 - 5 mm stab incision low down through the abdominal wall were necessary. All cysts were aspirated and brought to the outside, where they were deroofed or resection was done. We avoid the use of intra-abdominal instrumentation and manipulation of the ovary, resulting in less adhesion formation and therefore a better prognosis for future fertility.

The laparoscopic approach is a simple, safe and definitive treatment for these babies. This report supports its feasibility for complicated and large simple cysts, with the advantages of a short hospital stay, salvage of the ovary and an excellent cosmetic result.

### References

1. Brandt ML, Luks FI. Surgical indications in antenatally diagnosed ovarian cysts. *J Pediatr Surg* 1991; 26: 276-282.
2. Desa DJ. Follicular cysts in stillbirths and neonates. *Arch Dis Child* 1975; 50: 45-50.
3. Garel K, Filialtrault D. Antenatal diagnosis of ovarian cysts: natural history and therapeutic implications. *Pediatr Radiol* 1991; 21: 182-184.
4. Luzatto C, Midrio P. Neonatal ovarian cysts: management and follow-up. *Pediatr Surg Int* 2000; 16: 56-59.

**The laparoscopic approach  
is a simple, safe and  
definitive means of  
treating neonatal  
ovarian cysts.**



5. Dobremez E, Moro A. Laparoscopic treatment of ovarian cyst in the newborn. *Surg Endosc* 2003; 17: 328-332.
6. Endriquez G, Durán C. Conservative versus surgical treatment for complex neonatal ovarian cysts. *AJR* 2005; 185: 501-508.
7. Meizner I, Levy A. Fetal ovarian cysts: Prenatal ultrasonic detection and postnatal evaluation and treatment. *Am J Obstet Gynecol* 1992; 164: 874-877.
8. Hengster P, Menardi G. Ovarian cysts in the newborn. *Pediatr Surg Int* 1992; 7: 372-375.
9. Aslam A, Wong C. Autoamputation of ovarian cyst in an infant. *J Pediatr Surg* 1995; 30: 1609-1610.
10. McKeever PA, Andrews H. Fetal ovarian cyst: report of five cases. *J Pediatr Surg* 1988; 23: 354-355.
11. Bagolan P, Rovosecchi M. Prenatal diagnosis and clinical outcome of ovarian cysts. *J Pediatr Surg* 1992; 27: 879-881.
12. Schenkman L, Timothy BA, et al. Evolution in the surgical management of neonatal ovarian cysts: laparoscopic-assisted transumbilical extracorporeal ovarian cystectomy. *J Laparoendosc Adv Surg Tech* 2008; 18: 635-640.
13. Frischer JS, Midulla P. Unexpected benefit of the laparoscopic approach to a complex neonatal ovarian cyst. *Pediatr Endosurg Innov Tech* 2002; 6: 225-228.