Preoperative Sonography of Nonreducible Inguinal Masses in Girls

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ABSTRACT: Purpose. Inguinal hernia is one of the most common surgical pathologies in childhood. Any of the abdominal organs can slide into the hernial sac and become incarcerated there. In girls, the fallopian tubes, ovaries, uterus, and—rarely—ovarian cysts can form the sliding component of an inguinal hernia. The aim of this study was to investigate the diagnostic value of preoperative sonographic examination in girls with nonreducible inguinal masses.

Methods. Nine girls ranging in age from 2 months to 8 years who were admitted to our clinic with nonreducible inguinal masses were included in the study. All patients underwent sonographic examination followed by surgery on the day of admission.

Results. A definitive diagnosis was obtained in 6 patients on preoperative sonographic evaluation, whereas 3 patients were misdiagnosed. One patient was diagnosed sonographically as having lymphadenopathy, but surgery revealed an ovarian cyst sliding into the hernial sac. A second patient was found to have an infected lymph node at surgery instead of a strangulated bowel loop as diagnosed on sonographic examination. In the third patient, the preoperative sonographic diagnosis was an ovarian cyst in the hernia sac, but surgery revealed a cyst of the canal of Nuck.

Conclusion. Inguinal masses in young girls must be carefully evaluated, because the sonographic preoperative diagnosis may be misleading. Inguinal hernia repair is one of the most commonly performed surgical interventions in childhood. Incarceration and strangulation are the most common complications, and patients are usually admitted to the emergency department with nonreducible, painful masses in the inguinal region.¹ Usually, it is the small bowel that is incarcerated in the inguinal hernia sac; however, many abdominal organs can be seen in the inguinal canal, and necrosis of these organs may develop as a result of impaired circulation. Inguinal lymphadenopathy, spermatic cord cyst, and testicular torsion may also present with similar findings in this region.²,³ Although the definitive diagnosis of inguinal hernia is established by reducing the masses into the abdominal cavity, clinicians may face difficulties in the diagnosis of nonreducible masses. Sonographic examination of this region is usually sufficient to confirm the diagnosis; however, an inguinal exploration may sometimes be necessary. We present the sonographic and surgical findings in 9 girls with nonreducible inguinal masses.

Keywords: inguinal masses; ultrasound; groin; pediatrics; canal of Nuck; ovarian cyst

MATERIAL AND METHODS

All charts of patients with a diagnosis of inguinal mass who underwent surgery from June 2005 to
June 2006 in the pediatric surgery departments of 2 institutions were reviewed. Patients with reducible masses and/or without sonographic examination were excluded. Of 32 patients with a diagnosis of nonreducible inguinal mass, 9 patients had complete charts that were fully evaluable, thus they were included in the study. All 9 patients underwent sonographic examination with a Nemio 20 scanner using a 7.5-MHz linear-array transducer (Toshiba, Tokyo, Japan). All examinations were performed with the patient in the supine position. All patients underwent surgery on the same day as the sonographic examination.

RESULTS

All of the patients were girls. Their age ranged from 2 to 96 months (mean ± SD: 29.0 ± 40.7). The main presenting symptoms were pain and a palpable bulge in the groin. Other associated symptoms included abdominal pain in 5 patients and vomiting in 3 patients.

The sonographic diagnoses were ovary in 3 patients, ovarian cyst in 2 patients, cyst of the canal of Nuck in 2 patients (Figure 1), inguinal node in 1 patient, and intestinal loop in 1 patient (Figure 1). The results of surgery revealed that 3 patients were misdiagnosed with sonography. The first patient had a painless nonreducible inguinal mass in the right groin on admission. Sonographic evaluation revealed a well-defined cystic lesion of 1.6 × 0.8 cm size at a depth of 0.7 cm from the skin. There was no evidence of extension into the abdomen. This lesion was reported as an inguinal node. Surgery revealed that the mass was a lobulated ovarian cyst filled with clear fluid that was located at the distal external ring (Figure 2). The second patient presented with a palpable mass in the right groin, which was reported sonographically as a septated lesion measuring 1.8 × 1.2 cm and was diagnosed as an intestinal loop located at the external inguinal ring. Surgical exploration of the inguinal region revealed that the mass was an infected node filled with purulent material. Sonographic evaluation of the third patient revealed a cystic lesion that was 1.7 × 1.6 cm in size. It did not contain any solid tissue, and it connected with the abdominal cavity. Additionally, a normal left ovary was not visualized; therefore, the lesion was diagnosed as an ovarian cyst. At surgery, the mass was a cyst of canal of Nuck (Figure 3). Surgery confirmed the sonographic diagnosis in the other 6 patients.

DISCUSSION

A fallopian tube, ovary, or uterus may be present in the hernial sac in 21% of female patients with an inguinal hernia, and these structures may not be reduced into the abdominal cavity.1 Ovary in the hernial sac has the risk of torsion and infarction in 27% of all cases.2 Ovarian cysts may also be detected in the hernial sac.3 These cysts may become hemorrhagic and may present as painful masses. If left unreduced, a herniated ovary may be damaged because of subsequent torsion or compression of the ovarian vessels by strangulated bowel in the hernial sac.4

In our first patient, it was considered that the ovarian cyst slid into the hernial sac and became swollen, which prevented its reduction into the abdomen. Sonographic examination of the mass showed no connection with the abdominal cavity, and it was diagnosed as a node. In another patient, the cystic mass in the inguinal hernial sac was connected to the abdominal cavity by a thin neck and was therefore considered an ovarian cyst rather than a cyst of the canal of Nuck.

There are few reports in the literature about inguinal masses in children that cause diagnostic difficulties, and most involve boys. Boormans et al5 reported a patient who presented with nausea, vomiting, and acute abdominal pain. Sonographic evaluation suggested an inguinal hernial sac with bowel contents; however, subsequent right inguinal exploration revealed only unspecified necrotizing tissue, the histologic examination of which revealed a perforated adenocarcinoma.

FIGURE 1. Cyst of the canal of Nuck. The oblique sonogram shows a bilobulated cystic mass in the right inguinal region. Surgery confirmed the diagnosis.
Yokoyama et al.\textsuperscript{6} reported a patient who presented with a nonreducible right inguinal hernia. CT demonstrated a soft tissue density mass with heterogeneous enhancement within the right inguinal canal, and inguinal exploration showed that the mass originated from the hernial sac itself. In contrast, Hirano et al\textsuperscript{7} reported a patient with abdominal pain whose CT scan revealed torsion of the greater omentum, a finding that was confirmed at surgery. Matsumoto et al\textsuperscript{8} reported the case of a patient who presented with pain and swelling in the right inguinal region and in whom sonographic evaluation revealed a hypoechoic area adjacent to the right testicle. At surgery, a necrotic cyst was found that was rotated 270° in the hydrocele sac. Motta et al\textsuperscript{9} reported 3 cases of boys with pain and scrotal swelling that was diagnosed as peritesticular

\begin{figure}
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\caption{Hernial sac containing an ovarian cyst. (A) Preoperative photograph of the patient shows right inguinal bulge. (B) Transverse sonogram shows cystic lesion in the right inguinal region (calipers) erroneously diagnosed as a node. (C) Intraoperative photograph shows an ovarian cyst.}
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\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure3}
\caption{Cyst of the canal of Nuck. (A) Longitudinal sonogram of the left inguinal region shows an anechoic cystic mass connected with the abdominal cavity. The normal left ovary was not visualized, and a sonographic diagnosis of ovarian cyst in the hernial sac was made. (B) Intraoperative photograph shows the cyst of the canal of Nuck.}
\end{figure}
multiseptated fluid collection on sonographic examination. They found a rotated inguinal hernial sac during inguinal exploration.

Inguinal masses are among the most common conditions in children who are referred to outpatient clinics. They must be evaluated meticulously—especially in girls, who may present with sliding ovary, fallopian tube, and any organ in the abdomen. Despite advances in imaging, the definitive diagnosis of the masses in the inguinal region may remain difficult, and differential diagnosis should be made carefully.

REFERENCES