Recurrence and complications of pediatric inguinal hernia repair over 5 years
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Introduction and aim Inguinal hernia is one of the most common pediatric diseases in children and it presents most commonly during the first year of life. The aim of this study was to determine epidemiologic indexes and complications of inguinal hernia repair in pediatric patients who underwent inguinal hernia surgery.

Patients and methods This retrospective study was carried out in the Imam Khomeini and the Abuzar hospitals. All inpatients who underwent surgery for inguinal hernia from 2003 to 2004 were included in this study. Their hospital records were reviewed till 2007 for age, sex, wound infection, recurrence, and other complications. The \( \chi^2 \)-test was used for analysis using SPSS, version 13.0.

Results In this study, 269 children were included. Of all the patients, 237 (88.1%) were boys and 32 (11.9%) were girls (\( P < 0.001 \)). The median age at the first reference to the surgeon was 2.93 years. Right-side and left-side inguinal hernia was observed in 136 (50.55%) and 92 (34.20%) cases, respectively. Bilateral inguinal hernia was observed in 41 (15.25%) cases. The frequency of recurrence was 2.2%, and was observed only in boys. Postoperative complications were observed in 5.2% of the cases. The most common of them was anesthetic complication.

Conclusion Most of the cases involved male patients. All of the recurrences were in male patients. Postoperative complications were observed in 5.2% of the cases. Ann Pediatr Surg 9:58–60 © 2013 Annals of Pediatric Surgery.

Keywords: complication, inguinal hernia, pediatric, recurrence

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Introduction and aim
The most frequent surgery in pediatric practice is inguinal hernia [1,2]. Inguinal hernia is observed in 3.5–5% of full-term neonates [3]. Inguinal hernia occurs predominantly in male patients [4]. The recurrence was reported to be 0.68–4% in different studies [5–8].

Although the trend of laparoscopy in the treatment of inguinal hernia is increasing [9,10], because of some economic factors, open surgery remains the most commonly used approach. In the Khouzestan province, with a population of more than 4,000,000, the pediatric surgery ward was founded about 10 years ago. Hence, as the referral centers of pediatric surgery, we decided to perform this study to determine epidemiologic indexes and complications of inguinal hernia in pediatric patients who underwent inguinal hernia surgery.

The aim of this study was to evaluate pediatric clinical specifications and complications of inguinal hernia in the pediatric surgery ward in Ahvaz, Iran.

Patients and methods
All inpatients less than 12 years of age who were operated during 2003–2004 with a diagnosis of inguinal hernia were included in this study. The place of study was the Imam Khomeini hospital and the Abuzar children’s hospital: two referral centers for pediatric surgery. These hospitals have three pediatric surgeons and support the Khouzestan province with a population of more than four million. Their hospital records up to 2007 were reviewed for surgical complications and inguinal hernia recurrence.

Patients with a history of kidney, liver, and heart failure were excluded from the study. Healthy neonates and children without evidence of medical conditions were included. Age, sex, and side of involvement were recorded for each case. Data were analyzed using SPSS software, version 13.0 (SPSS Inc., Chicago, Illinois, USA). A \( P \) value of less than 0.05 was considered to be significant. After surgery, patients were visited in the first week. Parents were requested to visit the hospital if there were complications such as pain, wound infection, and fever.

Results
In this study, 269 cases were included. Of all patients, 296 were boys and 32 were girls (\( P < 0.001 \)). Of these patients, eight were less than 1-month old, 96 (35.7%) were 1-month to 1-year old, and 165 (61.3%) were greater than 1-year old. Clinical specifications and the demographic future are shown in Table 1.

Of all cases, 255 were without postoperative complications (\( P < 0.001 \)). Seven (2.6%) cases involved short-term complications of anesthesia. Most of them had cough and low-grade fever.

Hematoma and bleeding were observed in three cases. Wound infection was observed in one (0.4%) case. One (0.4%) case involved seroma, and two (1.4%) had local pain and parotid swelling.

Of all cases, 17 patients (19 inguinal hernias) were readmitted. Six events of recurrence were observed in
Most of the bilateral inguinal hernia was reported in infants less than 6 months old [16].

Except anesthetic complications, recurrence is the most frequent (2.2% of all cases) complication of herniotomy.

Other studies reported recurrence as the most frequent complication and is reported to occur in 0.5–3.8% of the cases [8,17–19]. The concurrence rate of recurrent inguinal hernia after uncomplicated inguinal hernia repairs is generally reported at 0.5–1 [20]. In the study by De Lange and colleagues, there was a relatively high incidence of recurrence within 1 year after the surgery (2001 1.8%, 2005 1.3%) compared with the Bonnard and Aigrain’s study [20]. However, there is a report of recurrence of inguinal hernia between 1 and 9% in different reports involving different age groups [21–23]. The study by Vogels and colleagues comprised 2471 herniotomies in 1786 boys, of which 685 were bilateral, 713 unilateral on the right side, and 388 unilateral on the left side. There were 17 recurrences, with an overall incidence of 0.69% [24]. In our study, six (2.5%) patients showed recurrence and all of them were boys. The inguinal hernia recurrence rate in our study was higher than in other studies.

In our study, there was no report of testicular atrophy. In the study by Nah and colleagues on incarcerated inguinal hernia, 35 patients underwent open surgery. Of the 35 patients, five showed the following complications: vas transaction (1); testicular atrophy (2); inguinal hernia recurrence (1), and acquired undescended testis (1) [25].

In our study, three patients had hematoma and bleeding and one (0.4%) patient had seroma. In the De Lange et al.’s study [14], hematoma or seroma was found in 12 (1.6%) cases in 2001 and in seven (0.9%) cases in 2005. In the study by Yeung et al. [26] on 262 outpatients who underwent inguinal herniotomy, postoperative complications include wound hematoma (2, 0.8%), wound infection (2, 0.8%), hernia recurrence (8, 3.1%), and contralateral inguinal hernia (3, 1.1%). However, our patients underwent surgery as inpatient cases, and surgical complications were similar to that of inpatients who underwent surgery in the Yeung et al.’s study [26].

Among all cases, one patient (0.4%) showed wound infection. In the study by Tiryaki and colleagues 1000 children underwent surgery for indirect inguinal hernia from 1987 to 1993. There were 849 boys and 151 girls (M/F ratio: 8.5/1.5). Tiryaki et al. [27] reported wound infection in 1.9% of their cases. Ein and colleagues reported 1.2% of wound infection in their study. The duration of the Ein et al.’s study [28] was 35 years, from 1969 to 2004. In two periods of the De Lange et al.’s study [14], 0.3% of the patients were reported to have developed wound infection. There is evidence that the frequency of surgical site infection for outpatient (1%) cases is lower than that for inpatients (4%) [29]. However, all of our cases were inpatients, and the rate of surgical site infection was lower than that in the Audry et al.’s study [29]. This low rate of infection may be because of the small sample size in our study as compared with other studies or the use of improved techniques of surgery.
sterilization and prevention of infection in the surgical ward.

There was no mortality among our cases. In our previous study, there was no mortality among cases with inguinal hernia in the newborn period [30].

Most of our patients were greater than 1-year old followed by those in the age group of 1 month to 1 year. In the Nassiri study [12], 127 (24.3%) patients were up to 12 months old and 394 (75.7%) patients were greater than 12 months old. In the Kalantari et al.’s study [15], 123 (40.9%) patients were up to 6 months old and 196 (65.0%) patients were up to 2 years old.

**Conclusion**

We found that all of the ipsi-lateral recurrences were in male patients. The incidence of wound infection in our patients who underwent inguinal hernia surgery was similar or lesser than that in another study. The male/female ratio in our study was similar to that in another study.

**Limitations**

There were no reliable data to indicate that the cases included in this study were emergent or elective.

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**Conflicts of interest**

There are no conflicts of interest.

**References**