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 χ^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.**

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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 Khuzestan 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

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Table 1 Age, side of involvement, and recurrence in cases of inguinal hernia

	[*n* (%)]		
	Males	Females	*P* value
Number of cases	237 (88.1)	32 (11.9)	<0.001
Side of involvement			
Right	124 (52.3)	12 (37.5)	0.11
Left	84 (35.4)	8 (25)	0.24
Bilateral	29 (12.2)	12 (37.5)	0.0005
Age			
<1 month	7 (3)	1 (3.1)	>0.05
1 month to 1 year	83 (35)	13 (40.6)	0.53
>1 year	147 (62)	18 (56.3)	0.52
Recurrence rate (%)	2.5	0	>0.05

17 patients. There were 13 events of new contralateral inguinal hernia presentation. Of the 17 cases, there were two cases with simultaneous recurrent inguinal hernia and newly presented contralateral inguinal hernia.

Of the six recurrent inguinal hernia patients, four showed recurrence within the first year after surgery. Two patients with recurrent inguinal hernia were admitted after 1 year of surgery.

Discussion

In the current study, 88.1% of the patients were boys. In Ghoroubi *et al.*'s study [11], 83.7% of the patients were male. In a study by Nassiri [12] on 521 infants and children, 89.4% of the patients were boys.

Omar and colleagues studied 827 children operated for inguinal hernia between 1998 and 2002 retrospectively. They performed 865 herniotomies. Of their cases, 497 patients (60.1%) had right-side involvement and 292 (35.3%) had left-side involvement. Of the 827 cases, 38 patients (4.6%) had bilateral involvement [13]. In our study, 136 patients (50.55%) had right-side and 92 (34.20%) had left-side inguinal hernia. Bilateral inguinal hernia was observed in 41 (15.24%) cases. Our findings were similar to that of another study, but bilateral inguinal hernia was slightly higher than in Omar *et al.*'s study [13]. In the study performed by De Lange *et al.* [14] in 90 Dutch hospitals, 72.6–77.4% of the patients were male. Right-side inguinal hernia was observed in 59.5–59.9% of the cases.

In our study, recurrence was more common in male than in female patients. Readmission for contralateral-side involvement was also more common in male patients.

Kalantari and colleagues studied 301 patients in the 1-year follow-up period. In their study, 213 (70.7%) patients had right-side inguinal hernia and 88 (29.3%) had left-side inguinal hernia. During this period, they encountered 33 new inguinal hernia cases that consisted of five (1.7%) recurrences and 28 (9.3%) contralateral inguinal hernia [15]. In our study, of 269 cases, six events of recurrent inguinal hernia and 13 (4.8%) events of contralateral inguinal hernia were observed in the post-operative period. The follow-up period of our study was longer than that of the Kalantari *et al.*'s study [15].

In our study, bilateral involvement was observed in 12.2% of the male patients and 37.5% of the female patients. 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 undesended 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

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 inpatients 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.

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