An alternative approach to contralateral exploration in infants with unilateral inguinal hernia: Ultrasonography*

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Özet

Tek taraflı kasık fıtığı olan çocuklarda kontralateral eksplorasyona alternatif bir yaklaşım: Ultrasonografi

Bu çalışmanın amacı çocuk kasık kanalı patolojilerinin tanısında ameliyat öncesi ultrasonografi (US)'nin etkinliğinin belirlenmesidir. Ağustos 1996-Mart 1998 tarihleri arasında, klinik olarak kasık fıtığı (KF) tanısı almış iki yaş altı 60 çocukta her iki kasık kanalının değerlendirilmesi amacı ile US incelemesi yapıldı. US incelemelerinin sonuçları dikkate alınmaksızın tüm olgularda bilateral eksplorasyon yapılarak ameliyat öncesi US tanıları ile ameliyat bulguları karşılaştırıldı. US ile KF ve açık prosessus vaginalis (APV) tanısının doğruluk oranı % 96 bulundu. Klinik olarak tek taraflı KF tanısı alan 46 olgunun US incelemesinde karşı tarafta belirlenmemiş 13 KF ve 12 APV (toplam 25 olgu, % 54) tanımlanmıştır. Sadece bir olguda US ile normal olarak değerlendirilen tarafta ameliyat esnasında APV bulunmuştur (% 5). Yüksek prodüktivite (% 97), duyarlılık (% 92) ve özgüllük (% 95) oranları, US'yi güvenilir bir tanı metodu yapmaktadır. Sonuç olarak, tek taraflı KF olgularında ameliyat öncesi değerlendirmede karşı taraf için US incelemesi rutin olarak yapılmalıdır.

Anahtar kelimeler: *İnguinal herni, tanı, ultrasonography, children*

Summary

This study was designed to determine the efficacy of preoperative ultrasonography (US) in the diagnosis of groin pathologies in infants. From August 1996 to March 1998, 60 infants under two years of age with clinically diagnosed inguinal hernia (IH) were referred for US scans for both sides of the groin. Bilateral operations were performed regardless of preoperative US evaluation results and comparisons were made between US diagnosis and intraoperative findings. US diagnosis of IH and patent processus vaginalis (PPV) proved to be 96 % accurate. US examination of 46 patients with clinically diagnosed unilateral IH; defined 13 IH and 12 PPV (a total of 25) in the opposite groin (54 %). In only one patient with normal opposite groin, US diagnosis proved to be wrong with an intraoperative PPV finding (5 %). The high productivity (97 %), sensitivity (92 %) and specificity (95 %) of US in identification of IH+PPV makes US a highly reliable diagnostic technique. In conclusion, US examination of the opposite groin should routinely be performed on patients with clinically diagnosed unilateral IH before surgical intervention.

Key words: *Inguinal hernia, diagnosis, ultrasonography, children*

Introduction

Experience with the utilisation of the US in inguino-scrotal area pathologies is ever increasing in recent years [2,8,10,11]. For the first time Erez et al. used US for obtaining information about IH and PPV before surgical intervention [3].

Although the numbers vary between different pediatric surgery clinics, surgical repair of IH represents 37 % of total performed operations in infants and children [13]. Incidence of IH in the opposite groin following a unilateral repair is determined to be 50 % and 15-35 % in infants under one year of age and children over one year of age, respectively [1,4,8,12].

There is also a great agreement between this studies in PPV incidence (41-63 %) following unilateral IH repair, determined with contralateral exploration. Se-

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veral methods of investigation techniques have been available for evaluation of opposite groin. These techniques are not readily accepted because all are invasive [5,6,13]. On the other hand, US is a noninvasive, highly reliable, straightforward and complication free method that can widely be used.

Material and Methods

Between August 1996 and March 1998, 60 patients younger than two years (a total of 120 groins) with groin swelling admitted to Fırat Medical Center, Department of Pediatric Surgery were referred for US evaluation and included in this study. Children with undescended testes and hydrocele were not included in this study. Physical examination, US and intraoperative findings were recorded on a separate sheet and compared at the end of study.

Objects of contralateral exploration were explained to the parents of infants who were diagnosed with unilateral IH and consent for contralateral operation was obtained before the operation. The clinical examination and operative findings were evaluated by one senior pediatric surgeon (AK).

US assessment of the inguinal area was performed using a Toshiba-SSH 140 Doppler and 5 mHz high resolution linear probe (Toshiba Co, Tokyo, Japan) by three experienced radiologists (SS, MA, MC). Maximum diameter of the inguinal canal was measured on a longitudinal scan. Diagnosis of PPV and IH were based on the diameter of processus vaginalis and cases with 2-3 mm processus vaginalis diameter were diagnosed as PPV (Figure 1 A), while processus vaginalis diameter wider than 4 mm were diagnosed as IH (Figure 1 B). US findings without hypoechoic appearance of inguinal hernial sac or PPV and no obvious ductus deferens were identified as normal (Figure 2 A).

All patients were referred to the radiologists for bilateral inguinal area US scans without any given information about the clinical diagnosis. Bilateral inguinal exploration was performed on all 60 patients regardless of US findings. High-ligation was applied in cases with hernia or PPV, and intraoperative findings were recorded. All infants were operated upon as outpatients and were discharged on the same day.

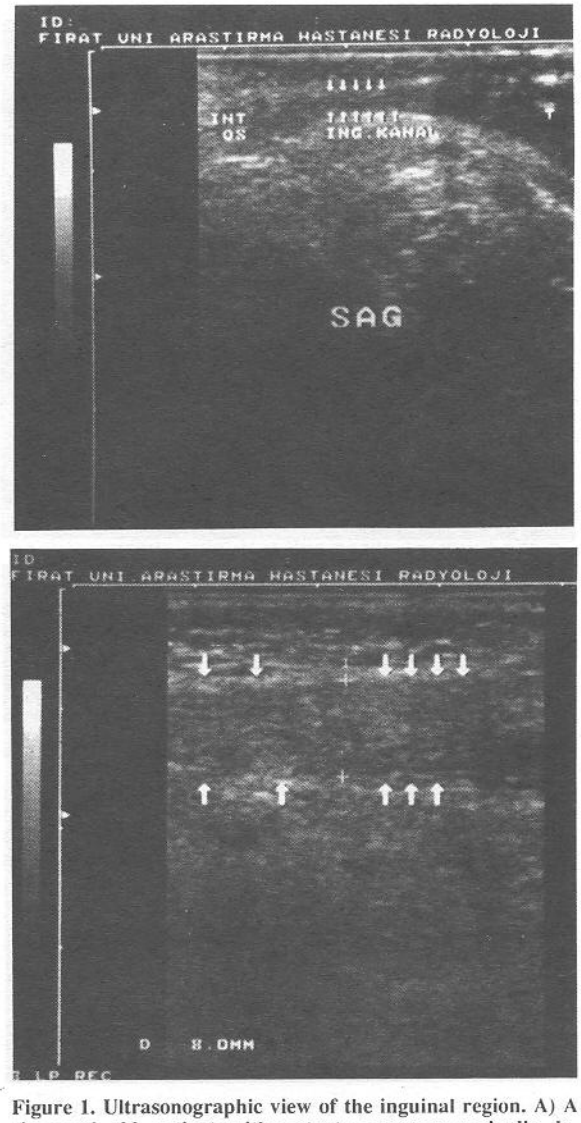

Figure 1. Ultrasonographic view of the inguinal region. A) A six-month-old patient with patent processus vaginalis demonstrated by a 3 mm hypoechoic area, B) A one-year-old patient with inguinal hernia demonstrated by a 8 mm hypoechoic, homogenous area.

Intraoperative identification of PPV and IH were also based on inguinal canal diameter. IH were identified as the canal diameter wider than 4 mm and PPV cases had thin walled open canals with a diameter up to 3 mm.

Results

Patients' age ranged from 35 days to 2 years with a mean age of 11 months. There were 35 male (87.5 %) and 5 female (12.5 %) patients as shown in Table I. Of the 60 clinically identified cases, there were 14 bilateral inguinal hernia cases and 12 of them pro-

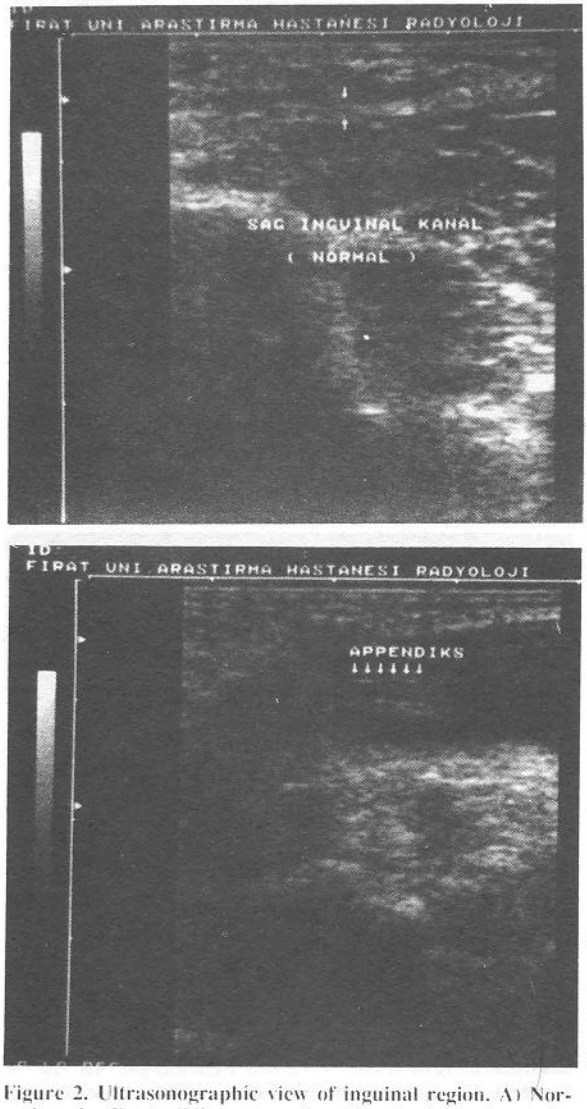

Figure 2. Ultrasonographic view of inguinal region. A) Normal groin, B) A sliding appendiceal inguinal hernia on the right groin.

ved to be positive on US. Of the remaining two cases IH were proved on the right while left inguinal explorations detected PPV. Bilateral IH diagnosis with US were all consistent with intraoperative findings and were repaired.

Among the 25 of the 27 clinically identified, right IH were proven to be positive with US. US scans identified two PPV on the right side. Opposite groin scanning were also performed and 6 IH and 5 PPV were identified. All clinically identified right IH were proven to be positive (27/27) with contralateral intraoperative findings as well as 7 IH and 4 PPV on the opposite side.

Table I. Patient profiles

	Number of cases	BH	RH	LH	Total
Male	53	12	24	17	53
Female	7	2	3	2	7
Total	60	14	27	19	60

BH: bilateral hernia, RH: right sided hernia, LH: left sided hernia.

Table II. Comparison of US and intraoperative findings of opposite groins

	US findings of opposite groin	IH	Operation PPV	Findings normal	Total
IH	13	12	-	1	13
PPV	12	-	11	1	12
Normal	21	-	1	20	21
Total	46	12	12	22	46

US: ultrasonography, IH: inguinal hernia.

In 18 of 19 cases clinically diagnosed left IH were confirmed with US. While 1 of 19 cases was found to be negative. Contralateral US scans of these group of patients also revealed the presence of 7 IH and 7 PPV on the right side. All clinically identified left IH were proved to be positive (19/19) with contralateral intraoperative findings as well as 7 IH and 5 PPV on the right side.

In 21 of 46 clinically diagnosed unilateral IH cases, normal groin was found on the opposite side and only 1 of 21 was found to have a PPV (4.8 %) when contralateral exploration was performed (Table II). There was no operative and postoperative complication in any case.

Altogether, IH and PPV were correctly diagnosed in 116/120 groin (96 %), while there were 4 unconfirmed cases. On the other hand, 2 false-positive (4 %) and one false-negative (2 %) result was obtained when contralateral US examinations were performed on 46 patients with clinically diagnosed unilateral IH. In this group of patients 93.6 % of US diagnosis proved to be correct at operation. When both IH and PPV were ultrasonographically evaluated at the same time, 100 % the cases were proved to be correctly diagnosed in bilateral IH.

During inguinal examination a two month old infant was found to have a sliding hernia (Figure 2 B), and it was confirmed and repaired by operation.

Discussion

If there is no detectable inguinal hernia on physical examination of the inguinal area, thickening of the cord or silk glove signs are subjective findings for PPV or IH. Herniography, which involves intraperitoneal injection of contrast agent, pneumoperitoneum, operative insertion of a choledochal dilator to detect a possible contralateral PPV are among the invasive methods and are not commonly used [3,6,13]. Therefore, diagnosis of IH, especially in cases with no obvious clinical symptoms on the contralateral groin, is very difficult.

Clinically, the incidence of contralateral IH following unilateral IH repair is about 50 % in infants younger than one year but this incidence rate is about 15-35 % in infants who had IH repair older than one year of age [1,4,9]. The incidence of PPV is reported to be 41-63 % [7].

Because of the high incidence of IH, Kiesewetter and Parenzan have recommended routine bilateral exploration in all infants under two years and this surgical approach was also supported by Gilbert & Clathworthy [4,9]. Additionally Grosfeld recommends routine contralateral exploration in all females, left-side IH and in infants younger than four years [5]. In this study, routine bilateral explorations were performed in infants younger than two years.

Routine contralateral exploration offers the following advantages: **i)** avoiding the second anesthetic risks and psychologic trauma, **ii)** early repair of asymptomatic hernia, **iii)** cost effective, **iv)** avoidance of the risk of incarceration and strangulation at the older ages. On the other hand, when routine bilateral explorations are performed, there is an unnecessary surgical intervention in at least in half of the cases and it also brings along an infection risk and trauma risk in testes and ductus deferenses [3,14].

Although pediatric surgeons have still not agreed on a policy, many surgeons prefer to perform contralateral exploration in females, in left side hernias and in infants younger than (some authors prefer four) two years [5,14]. But in the recent years Lloyd & Rintala have recommended contralateral exploration not to be routinely performed in children of any age with a unilateral inguinal hernia, because of the risks of unnecessary exploration to contralateral groin structures (especially ductus deferens) [13]. Thus, detailed examination of the inguinal area is very important before IH operations.

Because one in five PPV will eventually lead to a clinical hernia routine contralateral exploration of patients with only PPV is controversial. Considering the advantages, contralateral exploration can be suggested in unilateral IH cases when PPV is detected on the opposite side. But this needs a careful examination to differentiate IH and PPV from normal groin. In this study, we identified PPV and IH with only 6.2 % false identification rate in unilateral hernia cases without any complaint on the opposite side. The high productivity (97 %), sensitivity (92 %) and specificity (95 %) of US in identification of IH and PPV makes US a highly reliable diagnostic method.

We found US is not only complication free, easy to apply, non-invasive but also provides a 96 % accurate identification including bilateral cases. These results are in parallel with the study of Erez et al [3]. Additionally, contralateral IH and PPV cases represent 26/46 cases (57 %) which is consistent with the literature [1,4,6,8].

Exploration of 21 groin that were identified as normal with US made it possible to test false-negative results. In this study, only one false-negative result (4.8 %) was determined by contralateral exploration. During this study we diagnosed an appendiceal sliding inguinal hernia with US. To date, there is no other published study mentioning the diagnosis of appendiceal sliding in inguinal hernia before operation with US (Figure 2 B).

In conclusion, we consider US as a highly reliable method in evaluation of the inguinal canal. Routine US provides helpful information about the opposite groin in clinically unilateral IH cases. We believe that contralateral exploration should not be performed unless PPV or IH are not diagnosed with preoperative US.

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