Eur Arch Otorhinolaryngol (2008) 265:1057–1060
DOI 10.1007/s00405-008-0595-y

OTOLOGY

Isolated preauricular pits and tags: is it necessary to investigate renal abnormalities and hearing impairment?

Yezdan Fırat · Şule Şireci · Cengiz Yakıncı · Mustafa Akarçay · Hakkı Muammer Karakaş · Ahmet Kemal Fırat · Ahmet Kızılay · Erol Selimoğlu

Received: 20 August 2007 / Accepted: 21 January 2008 / Published online: 6 February 2008

Abstract We investigated the incidence and co-existence of hearing impairment and renal abnormalities in healthy children with preauricular tags and pits. Study population consists of 13,740 primary school children from routine health check. Thirty-five children with preauricular tags and pits were noted. Control group consisted of 91 patients without pits and tags, who underwent renal ultrasound and were scheduled to pediatric outpatient clinic. Urinanalysis, renal ultrasound, otoacoustic emission were performed in both the groups. The prevalence of renal abnormality (1/36; 2.7%) and hearing impairment (1/36; 2.7%) in patients with preauricular tags and pits was similar to that of control group (3/91; 3.2% and 4/91; 4.3%) ($P = 0.87$, $P = 0.64$, respectively). According to our results, it is not necessary to investigate hearing or urinary abnormality in patients with preauricular tag or pit, unless there is an association of a syndrome or family history of hearing or renal impairment.

Keywords Preauricular pit · Preauricular tag · Renal abnormality · Hearing impairment

Y. Fırat (✉) · M. Akarçay · A. Kızılay · E. Selimoğlu
Otorhinolaryngology Department, Inonu University, Turgut Ozal Medical Center, 44280 Malatya, Turkey
e-mail: yfirat@inonu.edu.tr; yezdanf@yahoo.com

Ş. Şireci · C. Yakıncı
Department of Pediatrics, Inonu University, Turgut Ozal Medical Center, 44280 Malatya, Turkey

H. M. Karakaş · A. K. Fırat
Radiology Department, Inonu University, Turgut Ozal Medical Center, 44280 Malatya, Turkey

Introduction

A patient with isolated minor external ear deformities almost always confuses physicians. In the relevant literature, it is well known that patients with syndromic external ear anomalies should be investigated for renal abnormality or hearing impairment [1, 2]. But the necessity for urinary tract or hearing evaluation in isolated preauricular tags or pits is controversial [3–6]. With the incidence of 5–10 per 1,000, isolated preauricular tags or pits are the most common minor external ear abnormality and are incidentally noted during physical examination [1, 2]. Previous separate studies have mentioned the roles of renal ultrasonography, behavioral audiometry, brainstem evoked response audiometry and blood renal function tests or urinanalysis [1, 3–7]. Their results are controversial and do not overlap each other. They studied the incidence of both hearing and renal abnormality by renal ultrasonography (US) and otoacoustic evaluation, separately. In this study, we aimed to evaluate the incidence of hearing and renal abnormality in patients with preauricular tags and pits in our population and in addition to previous studies; we also investigated the coincidence of those abnormalities.

Materials and methods

Patient group

Patient group includes 36 children with preauricular tags and pits, detected during the routine health check of primary school children. Ninety-one children, evaluated for headache in otolaryngology and pediatric clinics were included into the control group. All participants ranged between 7 and 16 years. Renal investigation and hearing

evaluation were performed in both the groups. Patients with other craniofacial anomalies, acquired otological problems, and a family history of renal anomaly or hereditary sensory-neural hearing impairment were excluded from the study. The study was approved by the local ethic committee. Informed consent was obtained from the legal guardians of patients and control group, prior to the above-mentioned examinations.

Otological examinations

Following otoscopic evaluation, hearing was evaluated with screening-OAE (Echocheck; Otodynamics Ltd., Hatfield, UK)) according to "pass/refer" evaluation system. If the patient has failed the test, further evaluation was done with a hearing test battery including tympanometry, acoustic reflex and audiometric measurements or brainstem evoked responses audiometry.

Renal examinations

Renal US (Philips Medical Systems, HDI 5000 scanner, Bothell, WA) was acquired for investigating urinary tract abnormality. Urinary tract and kidneys were evaluated by a single radiologist, experienced on genitourinary system examinations.

Statistical analysis

Patient and control groups were compared by utilizing the *t*-test for independent samples test. A value of $P < 0.05$ was considered statistically significant. Data were presented as mean ± SD.

Results

On routine health check of 13,740 primary school children, preauricular pits or tags were detected in 41 children (0.3%). Five children whose parents refused to give informed consent were excluded. In 36 patients, 7 of them had preauricular pits, 29 of them had tags. One patient had bilateral single preauricular tag. No abnormality was noted in renal US or hearing tests of this child. The demographic values of the study and control group were similar. Characteristics of patients with and without preauricular tags or pits are shown in Table 1.

In US of study group, we observed left sided severe hydronephrosis in one patient. Bilateral grade 2 reflux was noted in voiding cystouretrogram.

Table 1 Characteristics of children for both study and control group

Variable	Study group ($n = 36$)	Control group ($n = 91$)	*P* value
Gender (boy/girl)	14/22	44/47	0.33
Age	9.7 ± 4.7	9.3 ± 4.9	0.66
Maternal diseases/drugs	1	3	0.87
Consanguineous marriage	6	14	0.86
Renal abnormality	1	3	0.87
Hearing impairment	1	4	0.64

In control group, one child had left sided renal disgenesis and two children had ureteropelvic junction narrowing on right side. Although they were asymptomatic, further evaluation with blood and urine analysis, voiding cystoureterogram and radionuclide scintigraphy were acquired. We observed renal calculus in two children who had no evidence of congenital abnormality. They underwent further metabolic evaluations. The prevalence of renal abnormality in study and control group was 2.7 and 3.2%, respectively. There was no statistically significant difference between patient and control groups ($P = 0.87$).

OAE measurements could not be observed in one patient of the study group and four patients of the control group. These patients were evaluated with audiometry and tympanometry. Following additional hearing test battery, the bilateral mild hearing loss was detected in all the children. All of the hearing impairments, in both study and control group, were conductive type hearing loss due to secretory otitis media and sequela of otitis media. Medical or surgical treatments were planned for treatment of hearing loss. The incidence of hearing impairment in study and control group was 2.7 and 4.3%, respectively. There was no statistically significant difference between the patient and control groups ($P = 0{,}64$). Comparisons of renal abnormality and hearing impairment between study group and control group are shown in Table 2.

Discussion

The outer ear anomalies, pit and tag may be isolated or a component of a syndrome. In patients with syndromic external ear anomalies, renal and hearing investigation was suggested [1, 2]. But there were controversial conclusions in the relevant literature about the necessity for urinary tract and hearing evaluation in isolated preauricular tags or pits [3–6].

The association of kidney and ear anomalies are well described in some syndromes; particularly Townes–Brocks syndrome (TBS), Nager syndrome, oculoauriculovertebral spectrum, CHARGE association, Miller syndrome, diabetic embryopathy and Brachio-oto-renal syndrome (BOR) and

Table 2 Comparisons of renal abnormality and hearing impairment

	n	Renal abnormality (RA)	Hearing impairment (HI)
Study group ($n = 36$)			
Preauricular pit	7	No RA	No HI
Preauricular tag	29		
Unilateral tag ($n = 26$)	1	Left renal hydronephrosis w/o obstruction	No HI
	1	No RA	Conductive type HL
	26	No RA	No HI
Bilateral single tags	1	No RA	No HI
Control group ($n = 91$)			
	1	Left renal dysgenesia	No HI
	2	Right ureteropelvic junction narrowing	No HI
	4	No RA	Conductive type HL
	84	No RA	No HI

BOR-related conditions. While in some of these syndromes, only outer ear deformity accompanies the renal abnormality and in some of the other syndromes, inner ear abnormality may be associated. Inner ear anomalies, which accompany renal anomalies, can be explained by a developmental defect in the late stage of the embryonic life that results in sensory-neural hearing loss [8]. Furthermore, the association of kidney and outer ear anomalies can be explained by gene expression in the early stage of embryonic period and different types of hearing loss may be present or absent in these syndromes [8].

In isolated pits and tags, although different authors obtained similar prevalence of renal or hearing abnormality in their studies, they concluded in controversial results. In a study from Canada, Leung et al. [9] notified that the prevalence of renal abnormality in children with preauricular pits was 4.3% (3/69). But one child from their study group had BOR syndrome, so their prevalence for children with preauriculer pits as a sole anomaly was 2.8% (2/69). They reported 1% renal anomaly in their general population and recommended routine renal ultrasonography for all children with preauricular pit. In another study from Israel, Kugelman et al. [3] examined 108 infants with preauricular tags and pits and compared them with 95 infants without tags or pits. The prevalence of renal abnormality in those groups is 2.2 and 3.1%, respectively ($P = 1$, not significant). They concluded that renal USG was not indicated in the routine evaluation of the newborn infant with isolated pits or tags. Kohelet et al. [4] from the same country, found no renal abnormalities in 69 control infants, but detected renal abnormality in 6 out of the 70 with preauricular tags and pits. Although latter authors defended that former study failed to detect an association between preauricular tags and renal abnormality due to their method [10]; in the relevant literature, there were lots of articles supporting needless renal investigation in isolated minor ear anomalies [3, 7, 11]. The prevalence of urinary tract abnormality in infants with isolated preauricular tags and pits ranged between 1.1 and 8.6% in previous studies and our result was also within these ranges [3, 4, 7, 9]. In our prospective study, we could not find any statistically significant difference between the prevalence of renal abnormality in children with (2.7%) and without (3.3%) pits and tags ($P = 0.89$). Both results are coherent with the prevalence of renal abnormality in healthy population (0–3.1) [3, 4, 7, 9, 12]. Our results also support the authors who decline to acquire renal evaluation in patients with tags or pits.

If a preauricular tag or pit is considered as part of a syndrome, it is well known that hearing impairment could be a manifestation of the spectrum [8]. But there are few studies about the prevalence of hearing impairment in patients with isolated ear tags or pits [5, 6, 13]. Kugelman et al. [5] found significantly higher incidence of hearing impairment in patients with isolated tags or pits than that reported in preschool children. Concurrently, Kankkunen et al. [6] recommended routine hearing assessment for clearly elevated risk of hearing impairment. They proposed that the prevalence of hearing impairment, in patients with ear tag, as a sole anomaly was 13%, but in patients with family history of hearing loss was 67%. In our study group, one child had abnormal audiometry and tympanometry results in the study group (2.7%) and it was a conductive type hearing loss due to secretory otitis media. On the other hand, we observed one newborn baby with hearing loss, having craniofacial abnormalities and family history. He was excluded from the study group. While we screened his hearing, we found moderate sensory-neural hearing loss. In

control group, the prevalence of hearing impairment was 6.6%; these were conductive type, mild hearing loss. The prevalence of hearing loss was similar in both groups and there is no statistically significant difference ($P = 0.45$). Interestingly, the hearing loss type was conductive both in study and control group, while sensory-neural type hearing loss was noted in a child with syndromic external ear malformation. Our result supports that isolated tags or pits are not a high risk factor for sensory-neural hearing impairment, if it is not associated with a family history of hearing loss.

In the literature, there are lots of studies separately investigating hearing impairment or renal abnormality in patients with minor outer ear deformity. In this prospective study, we planned to investigate both together in the same study group. The prevalence of renal abnormality (2.7%) and hearing impairment (2.7%) were similar. But these abnormalities were not seen together in any of these patients. In patients with preauricular tag and pit, even in the presence of renal abnormality, there was no elevated risk of hearing impairment or vice versa. Also, we observed that multiple tags or bilateral tags did not cause any increase in the prevalence of renal or hearing abnormality. Even in the presence of hearing or renal abnormality, there is no need to investigate the other.

Conclusion

Our study provides that isolated preauricular tags or pits are not a high risk factor for sensory-neural hearing loss and urinary tract abnormalities. Presence of multiple or bilateral tags and pits does not worsen the risk of renal abnormality or hearing impairment. In patients with a preauricular tag or pit, if not associated with a syndrome or family history of hearing loss or renal impairment, it is not necessary to obtain routine hearing evaluation or renal investigation.

References

1. Wang RY, Earl DL, Ruder RO, Graham JM Jr.(2001) Syndromic ear anomalies and renal ultrasounds. Pediatrics 108:E32
2. Bianca S, Ingegnosi C, Ettore G (2003) Pre-auricular tags and associated anomalies: considerations for genetic counseling. Genet Couns 14:321–324
3. Kugelman A, Tubi A, Bader D, Chemo M, Dabbah H (2002) Preauricular tags and pits in the newborn: the role of renal ultrasonography. J Pediatr 141:388–391
4. Kohelet D, Arbel E (2000) A prospective search for urinary tract abnormalities in infants with isolated preauricular tags. Pediatrics 105:E61
5. Kugelman A, Hadad B, Ben-David J, Podoshin L, Borochowitz Z, Bader D (1997) Preauricular tags and pits in the newborn: the role of hearing tests. Acta Pediatr 86:170–172
6. Kankkunen A, Thiringer K (1987) Hearing impairment in connection with preauricular tags. Acta Paediatr Scand 76:143–146
7. Deshpande SA, Watson H (2006) Renal ultrasonography not required in babies with isolated minor ear anomalies. Arch Dis Child Fetal Neonatal Ed 91:29–30
8. Izzedine H, Tankere F, Launay-Vacher V, Deray G (2004) Ear and kidney syndromes: molecular versus clinical approach. Kidney Int 65:369–385
9. Leung AK, Robson WL (1992) Association of preauricular sinuses and renal anomalies. Urology 40:259–261
10. Kohelet D, Boaz M, Arbel E (2003) More on ear/kidney abnormalities. J Pediatr 142:454–455
11. Mishra D, Archana, Gupta VK (2003) Are isolated preauricular tags a marker of urinary tract anomalies. Indian Pediatr 40:796–797
12. Arora RS, Pryce R (2004) Is ultrasonography required to rule out renal malformations in babies with isolated preauricular tags? Arch Dis Child 89:492–493
13. Francois M, Wiener-Vacher SR, Falala M, Narcy P (1995) Audiological assessment of infants and children with preauricular tags. Audiology 34:1–5