INTRODUCTION
Branchio-oto-renal syndrome (BOR) is a rare autosomal dominant genetic disorder characterized by branchial arch anomalies, auricular malformations with hearing loss and renal anomalies. Melnick et al. were the first to describe this rare disorder in 1975 followed by Fraser et al. thus giving the name Melnick Fraser syndrome. The syndrome occurs in approximately 1:40,000 newborns and in about 2% of children with profound deafness. The clinical manifestations may include hearing loss of variable degree, anomalous pinnas, preauricular pits, branchial fistulas or cysts and renal anomalies ranging from hypoplasia to complete agenesis. The anomalies of malformed middle and/or inner ear and lacrimal duct are also well documented.

CASE REPORT
An 8 years old girl was referred to the otolaryngology department for the complaint of progressive hearing loss. There was history of recurrent ear infections since 4 years of age and she was diagnosed to have bilateral secretory otitis media. Grommets were placed in both ears but her hearing continued to deteriorate. There was also history of excessive lacrimation from the right eye with recurrent infections requiring topical antibiotics. On further inquiry parents gave history of intermittently discharging sinuses near ears and on neck. There was no history of any renal problems or systemic illness. She was born of non-consanguineous marriage and there was no history of hearing deficits, renal disease, and similar discharging sinuses in the parents or in her only sibling.

Physical examination showed a healthy child with bilateral preauricular sinuses (Figure 1) and branchial sinuses (Figure 2) at the junction of upper two third and lower one third of the anterior border of sternocleidomastoid muscles. Her right eye was smaller than left with excessive lacrimation suggestive of nasolacrimal duct blockade. On otoscopic examination, tympanic membranes were dull looking bilaterally. Rinnes was negative on both sides and Weber test not lateralized. Pure tone audiometry revealed hearing threshold at 60 - 70 decibels with air conduction and 20 - 40 decibels with bone conduction, indicating conductive type of deafness with air-bone gap being 30 - 40 decibels. Tympanometry was suggestive of otitis media with effusion left ear (type-B curve) and ossicular fixation in right ear (type-A curve). Stapedial reflexes were intact in both ears. Rest of the systemic examination was unremarkable. Suspicion of branchio-oto-renal syndrome was made and ultrasonography abdomen requested, which revealed a small sized, hypoplastic right kidney and normal left kidney. Intravenous urogram showed functionally normal both kidneys with normal urea and creatinine levels.

This report describes this rare disorder in a girl child.

DISCUSSION
The branchio-oto-renal (BOR) syndrome is an uncommon but well defined constellation of branchial arch anomalies (branchial fistulas, branchial cysts), external ear malformations with hearing loss and renal hypoplasia or dysplasia. It has an autosomal dominant transmission pattern with variable clinical expression. Around 80 mutations in EYA1, the human homologue of the dorsoptilia eyes absent gene, have been responsible for the development of BOR syndrome. Mutations in SIX1 and SIX5 have been reported less frequently,
however, role of SIX5 needs reconsideration in light of recent studies.\(^6\)

Abnormalities in the ossicular system which is derived from the first two branchial arches is responsible for deafness, while the branchial fistulae are linked to the second, third and fourth arches. Renal anomalies are related to a fault between the ureteric bud and metanephric mesenchymal mass as the ureteric bud branches into renal parenchyma.\(^7\)

Clinical features are highly variable. The most common presenting symptom is deafness (90%) which can be sensorineural or conductive but is mostly mixed (50%).\(^8\) Pre-auricular pits can be the presenting features in over 70% of the cases and sometimes can be the only external ear finding as seen in our patient, while around 50% of patients have external ear anomalies in the form of microtia to small lop or cupped ears with over folded superior helices.\(^9\) Middle ear anomalies include ossicular malformations and inner ear anomalies include cochlear hypoplasia or dysplasia.\(^10\) Renal anomalies include renal dysplasia and agenesis which can lead to end-stage renal disease.\(^11\) This patient had unilateral nasolacrimal duct obstruction which is an uncommon association of BOR syndrome.

Management includes excision of branchial cleft/fistulae, hearing aids and canaloplasty for atretic external auditory canal. End-stage renal disease may require dialysis or renal transplantation. Prognosis is good in the absence of renal disease with a normal life span. Six monthly and yearly hearing assessment and nephrologist consultations are recommended to pick manifestations at early stage. Relatives at risk should be screened for hearing loss and renal involvement to allow early diagnosis and treatment. Prenatal testing for fetuses at risk for an EYA1 mutation should be done in families in which the disease-causing mutation has been identified.

REFERENCES