Case Report

A case of VACTERL and non-VACTERL association without the "V and L"

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ABSTRACT

VACTERL is a cluster of congenital malformations based on the non-random association of various congenital malformations in a single patient. Here "V" denotes vertebral defects or vascular anomalies (single umbilical artery), "A" anal atresia, "C" cardiac abnormalities, "TE" tracheoesophageal fistula, "R"renal (kidney) abnormalities and "L" for limb anomalies) It is called an association, rather than a syndrome because the complications are not pathogenetically related, tend to occur more frequently than expected and are thought to be linked to embryonic mesodermal defects. Studies have reported the coexistence of various other congenital malformations such as respiratory, cerebral anomalies, which are frequently referred as non-VACTERL-type of associations. Diagnosis of VACTERL association is done only when at least three of the above mentioned congenital malformations are identified in a patient. Although 80% of these cases have vertebral defects, our case is unique as patient does not have one of the commonest occuring association i.e., vertebral anomalies, but has all other associations and an additional non VACTERL brain anomaly, hitherto unreported in the literature. The other highlight of this case is although reports say that VACTERL babies with ipsilateral renal disorder have the same side limb defects, our case has a renal anomaly with no limb anomaly. Finally VACTERL and non VACTERL association was considered in our patient in view of ventricular septal defect, tracheo esophageal fistula, anal atresia, renal anomaly, seizure disorder and global developmental delay due to pontocerebellar hypoplasia.

Keywords: Crossed fused ectopic kidney, gastro esophageal reflux scintigraphy, methylene diphosphonate bone scan, tracheo esophageal fistula, vertebral defects, vascular anomalies, anal atresia, VSD, renal and limb anomalies

INTRODUCTION

VACTERL is a cluster of congenital malformations that includes at least three of the following congenital malformations: "V" vertebral defects or vascular anomaly (single umbilical artery), "A" anal atresia, "C"cardiac abnormalities, "TE"tracheoesophageal fistula, "R"renal (kidney) abnormalities and "L"limb anomaly. In addition to these main defects, patients may also have other congenital anomalies like respiratory and cerebral abnormalities which are termed as non VACTERL association. VACTERL has an estimated incidence of approximately 1 in 10,000-1 in 40,000 live-born infants.[1-3] It is mainly believed to be a sporadic disease and commonly seen in diabetic mothers. Rarely familial inheritance is also reported in the literature.[4]

Access this article online

Quick Response Code:

Website: www.ijnm.in

DOI: 10.4103/0972-3919.125776

Etiology is thought to be embryologically related and it usually reflects perturbation of radial ray development.[5] Management usually depends on correcting specific congenital anomalies (like anorectal malformations,[6] certain types of cardiac anomalies and/or tracheo esophageal fistula [TEF]) in the immediate postnatal period, followed by long-term medical management of any sequelae of the congenital malformations.[6]

CASE REPORT

This case has been retrospectively diagnosed as a case of VACTERL association once patient was found to have crossed fused ectopic kidney by a bone scan performed for other reasons at 8 years of age.

On further interrogation, patient gave a history of repeated urinary tract infections. On searching medical records patient was found to be a known case of TEF that was repaired at 2nd day of life. Patient also underwent anorectal repair for anal atresia in the neonatal period. She is a known case of a perimembranous ventricular septal defect (VSD) at 1 year of age that underwent spontaneous closure (confirmed by

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echocardiogram). Patient developed a seizure disorder at 7 months of age that was grandmal type tonic clonic seizure, lasting 2-3 min, 3-4 episodes/day. Electroencephalogram (EEG) showed frequent bilaterally independent parieto occipito temporal epileptiform abnormalities with probable bilateral secondary synchrony. Patient also had global developmental delay in achieving milestones, with significant language delay corresponding to 3 years. Power and tone of muscles were unaffected. At 3.5 years of age, she had another episode of (afebrile) generalised tonic clonic seizures. MRI showed mild pontocerebellar hypoplasia. A repeat EEG was normal; hence patient was not started on antiepileptic medications.

Patient now presented to pediatrics department with intermittent fever, cough of 20 days duration with worsening breathlessness since 2 days. Cough was wet in nature, more during the night. Chest X-ray showed bilateral infiltrates with collapse consolidation of right lower lobe [Figure 1a]. Computed tomography of chest [Figure 1b] showed centrilobular nodules with the tree-in-bud appearance in the right lower lobes and anterior segment of right upper lobe (shown with arrows). Right hilar lymphadenopathy was also noted. Thus, a diagnosis of collapse with consolidation of right lower lobe with active bronchiolitis of right lower and anterior segment of right upper lobe was made. To ascertain the cause of respiratory infection, gastro esophageal reflux (GER) study was advised.

GER scintigraphy [Figure 2] is an important common complication post TEF repair.[7,8] The study was performed using 37 MBq of 99mTc Sulfur colloid mixed in fruit juice, which was ingested by patient. Dynamic images reveal grade III GER. However, there was no aspiration into both lungs at 4 h delayed images. Incidentally an abnormal focus of tracer accumulation was seen in dynamic and delayed images at the carinal level, which correlates to a site of esophageal out pouching (EOP). Barium swallow [Figure 3] was subsequently performed, which showed smooth transit of barium through the esophagus thus confirming the absence of any esophageal atresia. There was evidence of small contrast filled out pouching at the level of carina which corresponds to the tracer accumulation at carinal level in GER scintigraphy. On distending the stomach, reflux of contrast was noted into esophagus (up to the level of suprasternal notch) confirming grade III GER.

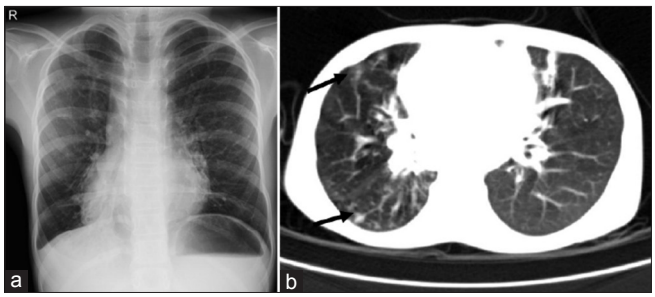

Figure 1: (a) Chest X-ray (PA view) showed bilateral infiltrates with collapse consolidation of right lower lobe. (b) Computed tomography chest shows centrilobular nodules with tree-in-bud appearance in right lower lobes and anterior segment of right upper lobe (shown with arrows). Right hilar lymphadenopathy was present. Collapse with consolidation of right lower lobe with active bronchiolitis of right lower and anterior segment of right upper lobe was noted

99mTc MDP, methylene diphosphonate whole body scintigraphy [Figure 4] was requested as patient also had complaints of intermittent pain in left side of chest. This scan showed normal tracer uptake in bilateral ribs and also showed no vertebral hot spots or limb anomalies. However a crossed fused ectopic kidney was noted adjacent to lower pole of the right kidney with suspicious hydroureter and distal obstruction. 99mTc DTPA (Diethylenetriaminepentacetic acid) renogram was suggested. Based on all these scintigraphic findings, a retrospective diagnosis of a VACTERL and non VACTERL association (ventricular septal defect, tracheo esophageal fistula, anal atresia, renal anomaly, pontocerebellar hypoplasia) was considered in our patient. Congenital limb and skeletal abnormalities that can be encountered are polydactyl, costovertebral defects, tibial aplasia/hypoplasia, clubfoot and hallucal deficiency which was absent in our patient.[5]

Management usually depends upon correcting specific congenital anomalies (like anorectal malformations, certain types of cardiac anomalies and/or TEF) in the immediate postnatal period, followed by long-term medical management of any sequelae of the congenital malformation. When optimal surgical correction is possible, the prognosis can be good, although sequelae of congenital malformations can persist throughout life.

DISCUSSION

VACTER association was first proposed in 1972 by Quan and Smith as the VATER association without the cardiac anomalies.[9]

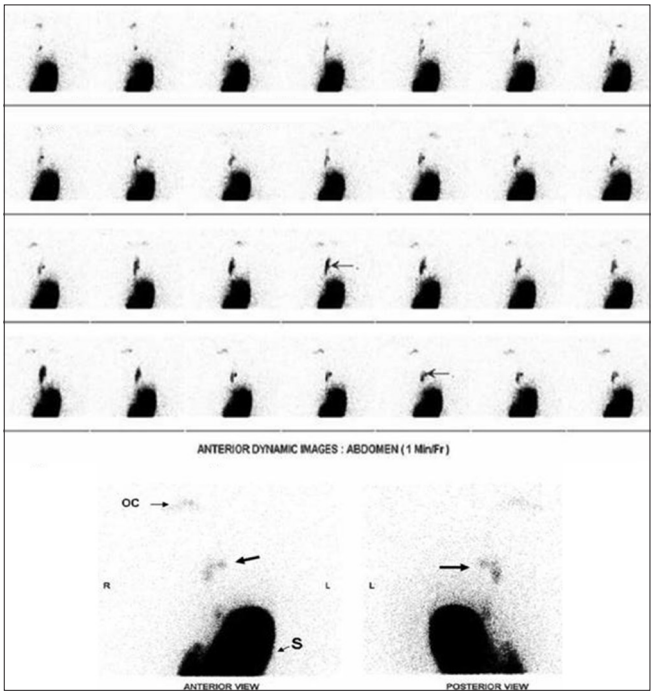

Figure 2: 99 mTc sulfur colloid gastro esophageal reflux (GER) scintigraphy ([a] dynamic and [b] high resolution static images) showed grade III GER with an abnormal tracer accumulation at the carinal level, which corresponds to the site of esophageal out pouching in barium swallow imaging performed the day after GER scan (shown with an arrow). ("OC" denotes oral cavity and "S" for stomach)

70% of malformations involve esophagus and the trachea, while the vertebrae/ribs and the cardiovascular system are seen in 68.9 and 65.6% patients, respectively. Anal atresia is seen in about 55%.[10] Of the congenital heart disease, VSD, atrial septal defect or tetrology of Fallot are common. Rarely truncus arteriosus and transposition of great vessels are seen. Nearly 70% of cases also have additional non-VACTERL-type defects, with high occurrences for single umbilical artery (20%), genital defects (23.3%) and respiratory tract anomalies (13.3%).[10] Renal defects are seen in approximately 50% of patients with VACTERL association.

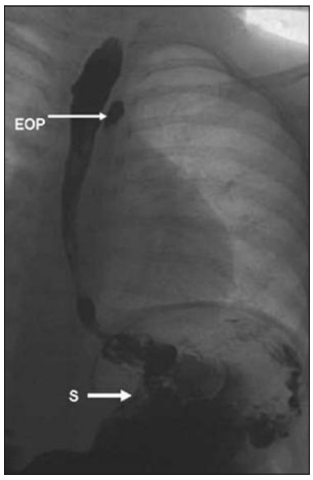

Figure 3: Barium swallow showed smooth transit of barium through the esophagus confirming absence of any esophageal atresia. There was evidence of small contrast filled out pouching at the level of carina (marked as esophageal out pouching). There was no stricture or hold up of contrast in esophagus. On distending the stomach (marked as S), reflux of contrast was noted into esophagus (up to the level of suprasternal notch) confirming grade III gastro esophageal reflux

Limb anomalies can occur in up to 70% of cases. This includes a displaced or hypoplastic thumb, polydactyly, syndactyly or forearm defects like radial dysplasia. It is also noted that babies with bilateral limb defects tend to have kidney or urologic defects on both sides, while babies with unilateral limb defects tend to have renal disorder also in the ipsilateral side. Many of them are born small and have difficulty with gaining weight. Babies with VACTERL association, however, do tend to have normal development and normal intelligence. Brain malformations with VACTERL association have been rarely described, hydrocephalus being the most common. Genetic predisposition of VACTERL has been recently identified in a so-called marker chromosome 9 (C9qh + variant) which needs further validation.[4]

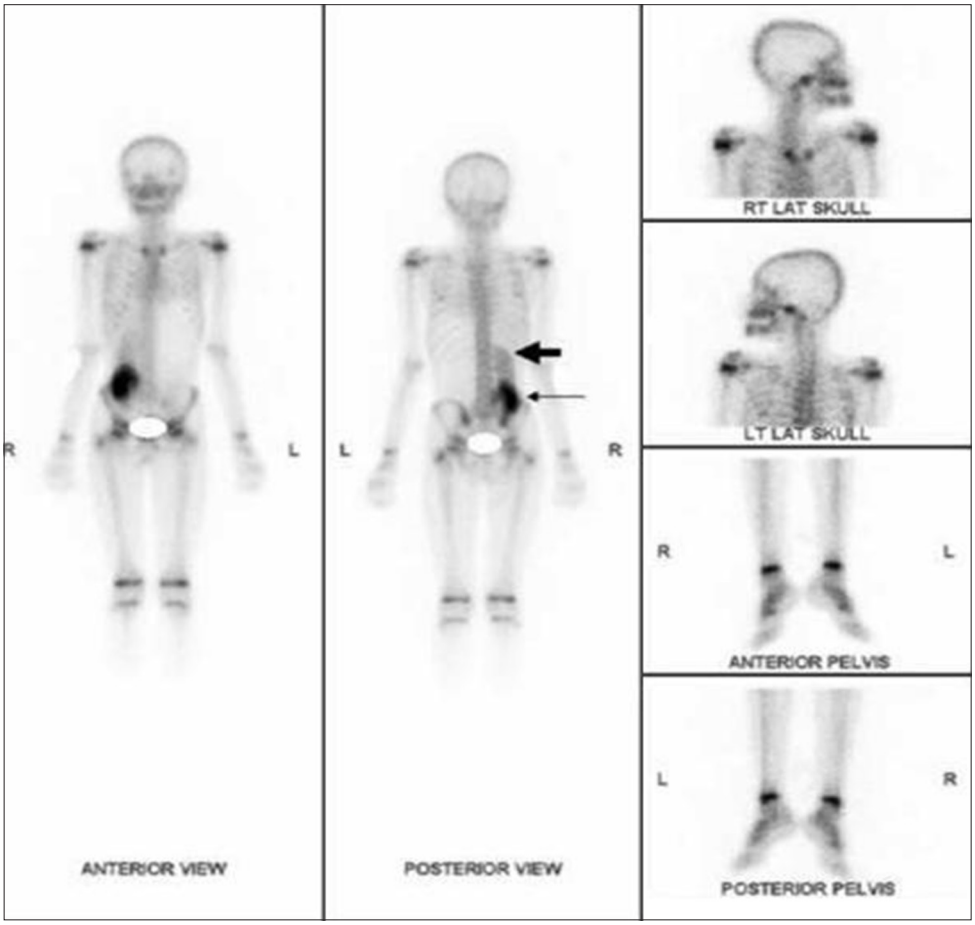

Figure 4: Tc methylene diphosphonate whole body scintigraphy showed no vertebral hot spots or limb anomalies. Incidentally crossed fused ectopic kidneys were identified with suspicious hydroureter and distal obstruction (shown by arrows). Bone abnormalities reported in VACTERL cases on literature survey are polydactyl, multiple costovertebral defects and limb anomalies such as tibial aplasia/hypoplasia, clubfoot, hallucal deficiency

CONCLUSION

A high degree of suspicion and knowledge of various combinations of congenital anomalies must be in kept in mind, which may be used to assist the pediatricians in the diagnosis of such complex cases. These are rare congenital anomalies, which need team management. Parental counseling also forms an integral part of this management.

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How to cite this article: Padma S, Sundaram PS, Sonik B. A case of VACTERL and non-VACTERL association without the "V and L". Indian J Nucl Med 2014;29:46-9.

Source of Support: Nil. **Conflict of Interest:** None declared.