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Acrocallosal syndrome

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Abstract

Presented here is a case of a 8 year old boy with typical clinical manifestations of Acrocallosal syndrome. The characteristic features of this syndrome are craniofacial abnormalities, distinctive digital malformation, mental retardation. The clinical and major nosologic aspects of this condition are discussed.

Key words: Corpus callosum, Frontal bossing, High-arch palate, Post axial polydactyly

Acrocallosal syndrome (ACS) is a rare autosomal recessive genetic disorder with hypoplasia / agenesis of corpus callosum, moderate to severe mental retardation, characteristic craniofacial abnormalities, distinctive digital malformations and growth retardation.[1]

ACS is also known by its synonyms: Schinzel Acrocallosal syndrome and Hallux duplication, Post axial polydactyly and absence of corpus callosum. The inheritance is autosomal recessive based on the reports of recurrences in families and parental consanguinity. The gene responsible for this disease has not yet been identified, although Pfeiffer *et al* suggested that the gene for ACS may be situated on chromosome 12p.[1]

The acrocallosal syndrome (ACS) was first reported by Schinzel in a 4-year-old boy with post axial polydactyly, hallux duplication, absence of corpus callosum, macrocephaly and mental retardation in 1979.[2] The name acrocallosal syndrome was proposed by Schinzel and Schimid in 1980.[3] Since Schinzels original description, ACS has been described in over 37 cases till date.[4] Presented here is a case of a 8 year old boy with features, compatible with the diagnosis of ACS.

Case Report

An eight year old male child, reported to the Department of Oral Medicine and Radiology Bapuji Dental College and Hospital, Davangere, Karnataka, with the chief complaint of over retained milk teeth and crowding of permanent upper and lower front teeth. History revealed that he is a second child of consanguinous parents. His birth was at full term normal delivery with birth weight of 2.5 kgs. On further enquiry, all his developmental milestones were delayed. His past surgical history revealed excision of supernumerary finger attached to fifth finger seven years back. There was no history of maternal illness, drug intake or exposure to radiation during antenatal period. The paternal and maternal age during his birth was 34 years and 25 years. The elder sibling was normal and there was no family history of any similar illness. Clinical examination revealed the following:

- Generalized growth retardation.
- Neurologic Signs: border line mental retardation, strabismus, hypotonia.
- Craniofacial abnormalities: Macrocephaly with dolichocephaly [Figure 1], frontal bossing [Figure 2], hypertelorism [Figure 1], down slanting palpebral fissure, posteriorly angulated malformed ears [Figure 2], short philtrum, small nose [Figure 1], with broad nasal bridge [Figure 1].
- Limb abnormalities: Long tapered fingers, postaxial polydactyly of hands [Figure 3], syndactyly of second and third toes [Figure 4], fifth finger clinodactyly [figure 5], hallux valgus. [Figure 6]

Others

- Triple hair whorl [Figure 7]
- Prominent occiput [Figure 2]
- Deep-set eyes
- Scoliosis [Figure 8]
- Micropenis [Figure 6]
- Cryptorchidism

Clinically, no cardiovascular and respiratory system abnormality was noted.

At the age of eight years patient had

Weight	13 kg.
Height	101.5 cms.
Head circumference	52 cms.
Chest circumference	62.5 cms.
IQ (Binet test)[5]	75 - Borderline mental retardation.
Mental age	5-6 years.
Total hand length	14.5 cms
Palm length	8.25 cms
Middle finger length	6.25 cms
Foot length	20 cms

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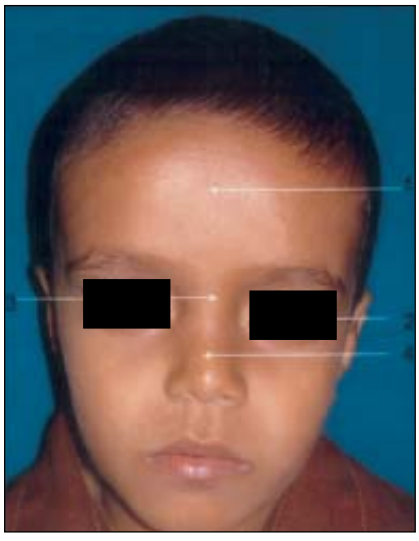

Figure 1: Frontal view showing 1) Macrocephaly, 2) Hypertelorism, 3) Broad nasal bridge and 4) small nose

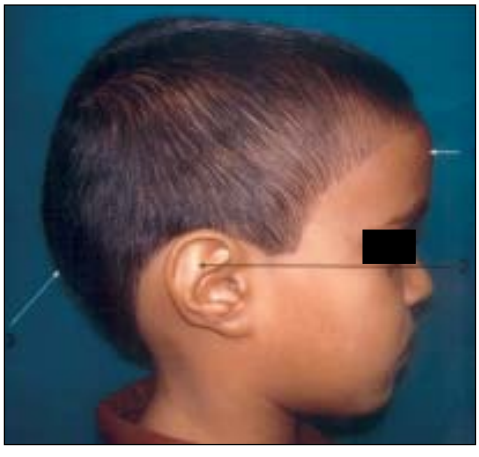

Figure 2: Lateral view showing 1) Frontal bossing 2) Posteriorly angulated malformed ears and 3) Prominent occiput

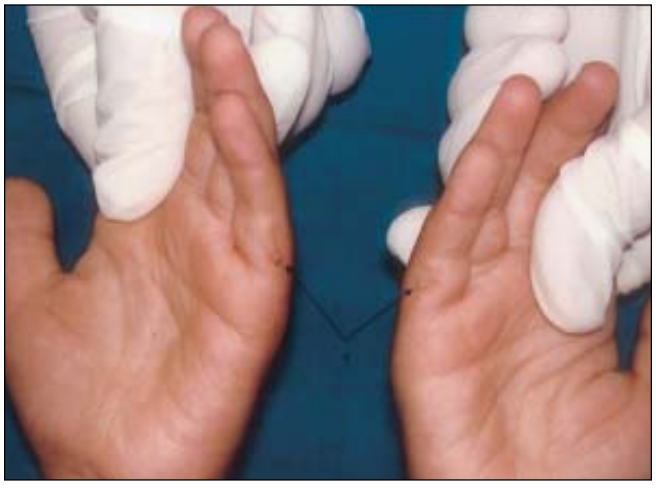

Figure 3: Hands showing 1) Postaxial polydactyly

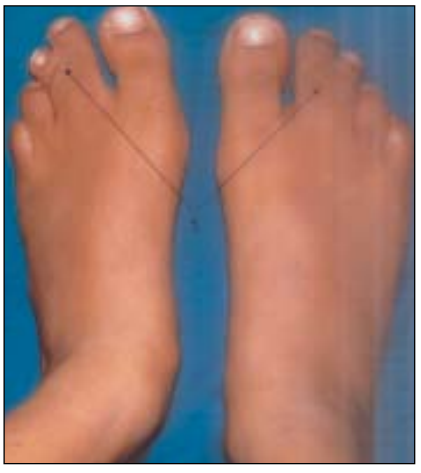

Figure 4: Legs showing 1) Syndactyly of second and third toes

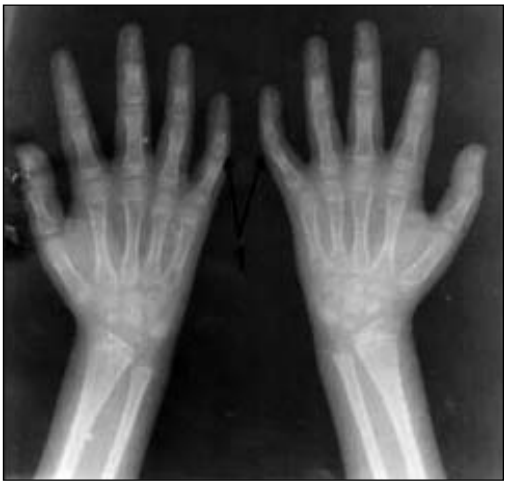

Figure 5: Hand-wrist Radiograph showing 1) Fifth finger clinodactyly

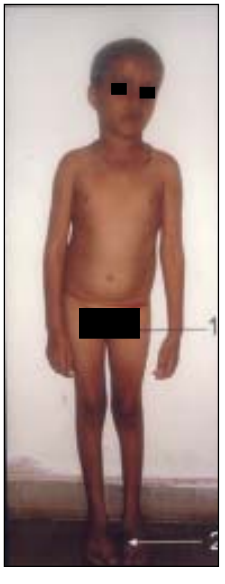

Figure 6: Frontal view showing Hallux valgus

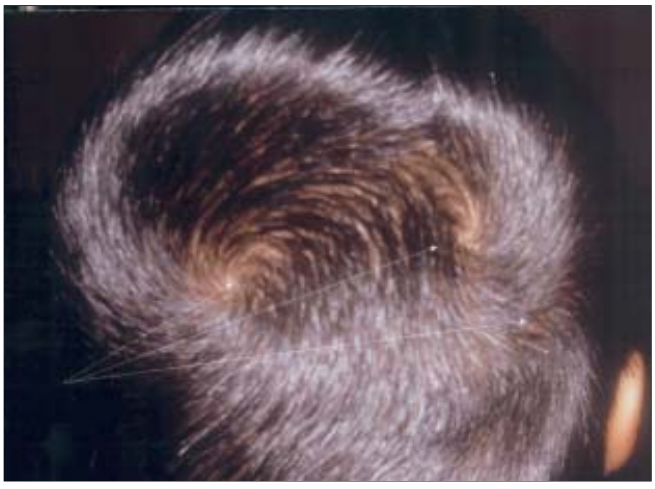

Figure 7: Showing 1) Triple hair whorls

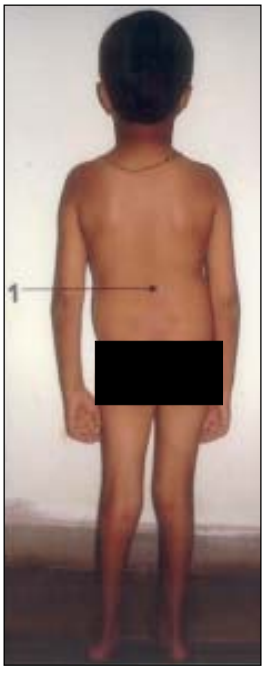

Figure 8: Posterior view showing 1) Scoliosis

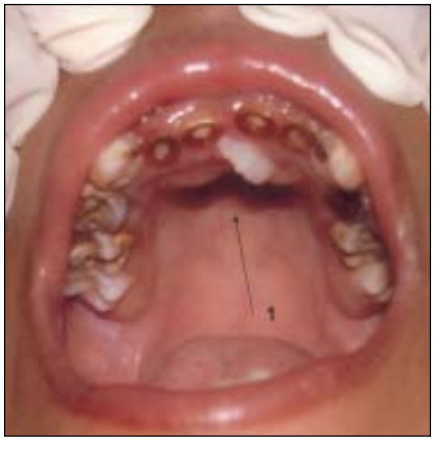

Figure 9: Showing 1) High arch palate

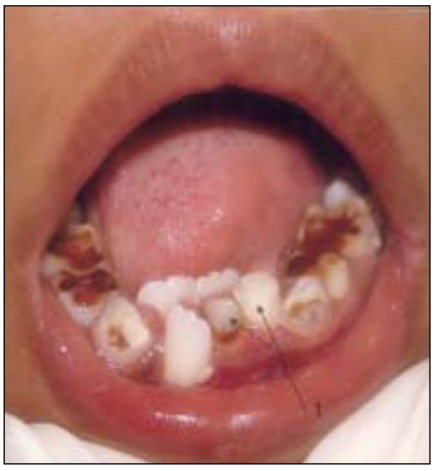

Figure 10: Showing 1) Lower anterior teeth crowding

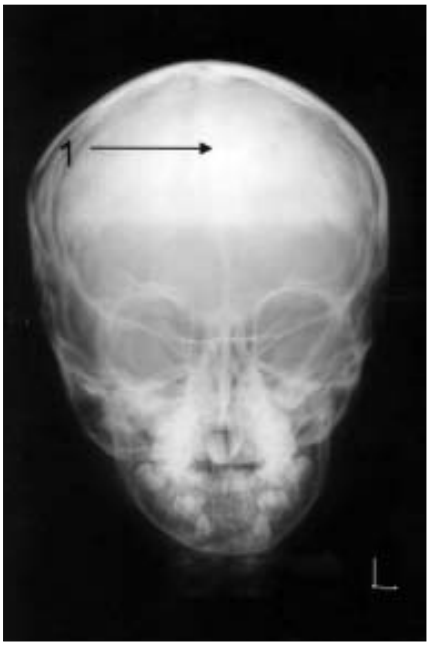

Figure 11: PA skull Radiograph showing 1) Macrocephaly

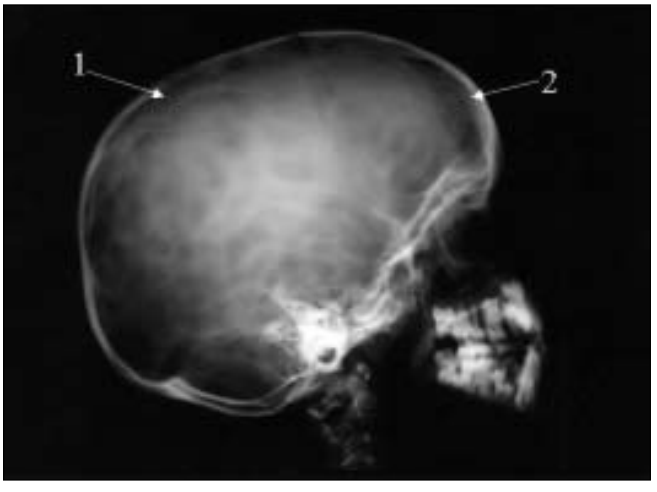

Figure 12: Lateral skull radiograph showing 1) Silver beaten appearance of skull and 2) Frontal bossing

Dental findings were as

16, 55, 54, 53, 52, 51, 61, 21, 62, 63, 64, 65, 26, 36, 75, 74, 73, 72, 31, 71, 41, 81, 82, 83, 84, 85, 46

- Teeth present

6EDC21 A1 BCDE6

- High arch palate [Figure 9]
- Lower anterior teeth crowding [Figure 10]
- Angle's class I molar relation

Investigations

Routine laboratory investigations were normal. Radiographic Investigations:

a) PA skull [Figure 11]
   - Macrocephaly
   - Dolichocephaly
b) Lateral Skull view [Figure 12]
   - Silver beaten appearance of skull
   - Frontal bossing
c) Cranial Plain Computerized Tomography [Figure 13 & 14]
   - Corpus callosal dysgenesis
   - Dolichocephalic skull
d) Hand wrist radiograph [Figure 5]
   - Fifth finger clinodactyly
   - Estimated bone age of 5-6 years
e) Chest radiograph
   - Scoliosis

The diagnosis is based on characteristic phenotype, in particular striking craniofacial and skeletal abnormalities.

Discussion

The Acrocallosal syndrome is a true multiple congenital anomaly/mental retardation autosomal recessive syndrome, whose pleiotropic effects mainly involve the central nervous system/facial midline and skeleton. Main manifestations include macrocephaly, large anterior fontanelle, prominent forehead, hypoplasia/agenesis of corpus callosum, hand (pre) postaxial polydactyly, feet pre (post) axial polydactyly, syndactyly, mental retardation, hypertelorism, strabismus, small nose, broad nasal bridge, high arch/cleft palate.[6] The other less frequent signs such as seizures, retinal pigment anomalies, optic atrophy, nystagmus, nipple anomalies, inguinal/ umbilical/ epigastric hernia and genital, visceral, cardiovascular and other cerebral anomalies.[6] There is no reported sex predilection.[7]

Initially it was thought to be an autosomal dominant condition but subsequent reports of consanguinity as well as affected ACS sibs born to unaffected parents, have suggested autosomal recessive inheritance.[8] The inheritance has been suggested to be autosomal recessive, thus there is a 25% chance of the next child being effected.[1] In India, first ACS was reported in 2003.[1] Pfeiffer *et al* (1992) reported de novo inverted tandem duplication of 12pl1.2 -p13.3 in a child with ACS.[1] ACS may represent a heterogenous group of disorders that, in some cases, may result from mutation in GL13 and represent a severe, allelic form of Greig's Cephalopolysyndactyly syndrome.[8] The patient being reported had mental retardation, dysgenesis of corpus callosum, post axial polydactyly involving both hands with syndactyly of feet. [Table 1] depicts the features of ACS in our case.

The differential diagnosis ACS includes Greig's Cephalopolysyndactyly syndrome, Oro-facial -digital syndromes Type I and II, Meckel-Gruber syndrome, Smith-Lemli-optiz syndrome, Rubinstein-Taybi syndrome.[3]

Management of ACS includes surgical correction of polydactyly, cleft palate, hernia, brain cyst/tumors and congenital cardiac malformations. Genetic counseling is of prime importance and antenatal diagnosis can be attempted by mutation analysis and antenatal ultrasound.[1] The dental

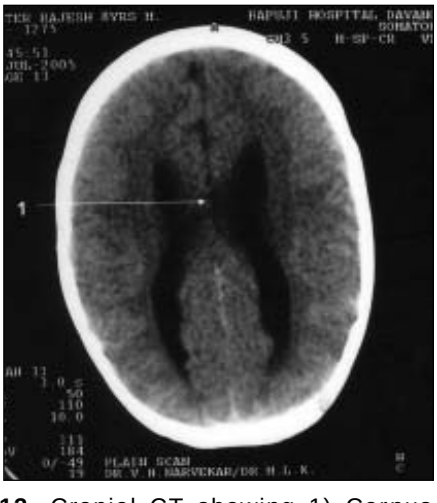

Figure 13: Cranial CT showing 1) Corpus callosum dysgenesis

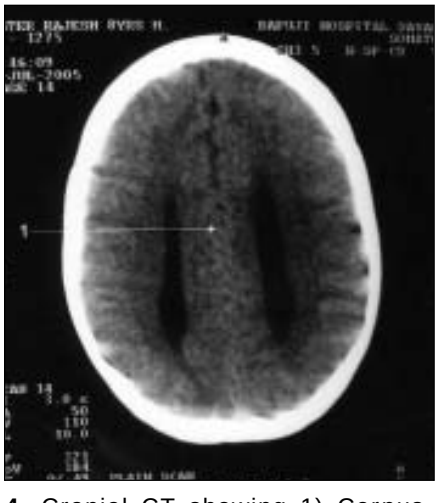

Figure 14: Cranial CT showing 1) Corpus callosum dysgenesis

Table 1: Features of acrocallosal syndrome

Features	Author	Index case
Hypoplastic or absent corpus callosum	Schinzel (1979)[2]	+
Mental retardation	Schinzel (1979)[2]	+
Cerebellar hypoplasia	Hendrik et al (1990)[9]	-
Seizures/abnormal EEG	Schinzel et al (1986)[2] Koenig (2002)[1]	-
Anencephaly	Koenig et al (2002)[1]	-
Hypotonia	Smith[10]	+
Macrocephaly	Schinzel and Schmid (1980)[2]	+
Hypertelorism	Schinzel (1988)[2]	+
Optical atrophy decreased retinal pigmentation nystagmus, epicanthal folds	Smith[10]	-
Strabismus	Smith[10]	+
Down slanting palpebral fissure	Smith[10]	+
Frontal bossing	Schinzel et al (1988)[2]	+
Malformed ears	Smith[10]	+
Small nose with broad nasal bridge, short philtrum	Smith[10]	+
Malformed congenital ears	Smith[10]	+
Heart disease	Casamassima et al (1989)[3]	-
Post axial polydactyly of hands and feet	Schinzel et al (1979)[2]	+
Syndactyly of feet, fifth finger clinodactyly, tapered fingers	Smith (1997)[10]	+
Hallux duplication	Schinzel et al (1979)[2]	+
Umbilical / inguinal hernia	Schinzel et al (1979)[2]	-
Hypogenitalism	Temtamy and Meguid (1989)[11]	+
High arch palate	Smith (1997)[10]	+

- = Absent + = Present

treatment planned for this patient was oral prophylaxis and extraction of over retained deciduous teeth along with root stumps followed by restoration of carious teeth.

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