

# Gorlin Goltz Syndrome: A Clinicoradiologic Insight

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## ABSTRACT

**Introduction:** Gorlin-Goltz syndrome is an rare hereditary autosomal dominant disease. Mutations in the PTCH1 gene cause the spectrum of developmental abnormalities. Maxillofacial surgeons and Rhinologists encounter these patients initially presenting with maxillary and mandibular swellings, the odontogenic keratocysts. The main features are multiple basal cell carcinomas, palmoplantar pits and jaw cysts. Patients are quite sensitive to ionizing radiation.

**Case series:** Here we present a case series of patients presenting with Gorlin-Goltz syndrome seen at the Department of Otolaryngology, Banaras Hindu University, Uttar Pradesh, India, in the period from 2014 to 2015. In the present case series all cases were in the age group of 10-30 years, of which 3 were male. All the cases were found to have multiple odontogenic keratocysts involving maxilla and mandible and falx and tentorial calcifications. 1 patient had basal cell carcinoma while 3 showed basal cell nevi. Only 2 cases had bifid ribs.

**Conclusion:** The series shows the varied manifestations of gorlin-goltz syndrome. It must be remembered that radiotherapy is relatively contraindicated in Gorlin-Goltz syndrome. Mutation analysis can be used to confirm the disease. Genetic counselling and life-long surveillance should be offered to the patients.

**Keywords:** Gorlin-goltz syndrome, odontogenic keratocysts, Nevoid basal cell carcinoma, bifid ribs

## INTRODUCTION

Gorlin-Goltz syndrome, also known as basal cell nevus syndrome, is an autosomal dominant disorder principally characterized by cutaneous basal cell carcinoma, multiple keratocystic odontogenic tumors, and skeletal anomalies. This syndrome may be diagnosed early by the otolaryngologists because keratocystic odontogenic tumors are usually one of the first and most common manifestations of the syndrome. Early diagnosis is of utmost importance in reducing the severity of long term sequelae of this syndrome. In 1960, Gorlin and Goltz described the condition as a syndrome comprising mainly of the triad of multiple basal cell nevi, jaw keratocysts, and skeletal anomalies.<sup>1</sup> This case series presents 4 cases of Gorlin-Goltz syndrome with detailed clinical and investigative features of this familial disorder.

## CASES SERIES

4 cases (3 males and a female in the age group of 10-30 years) presented to the Department of Otorhinolaryngology with complaint of swelling in the region of upper and lower jaw. There was no associated history of pain, tenderness or trauma. For their complaints CECT face was advised. All the cases showed multiple expansile lytic lesions involving mandible and/or maxilla with associated impacted teeth suggestive of odontogenic keratocyst and associated calcification of falx cerebri and tentorium cerebelli. Above findings raised a

possibility of Gorlin Goltz syndrome indicating further clinical work-up and investigations. On clinical examination 3 cases showed basal cell nevus and all 4 displayed various skeletal anomalies like fused ribs, bifid ribs, scoliosis and/or spina bifida. 1 case was operated and on histopathology odontogenic keratocysts was confirmed.

### Case 1

A 27 year old male, presented to us with progressive palatoalveolar swelling since childhood; with no associated pain, discharging sinus, facial heaviness, nasal obstruction or epiphora. CT scan of face (bone window) showed multiple cystic expansile lesion with unerupted teeth suggestive of odontogenic keratocysts. Incidentally the visualized part of cranium of the CT scan Face revealed calcification of falx cerebri and tentorium cerebelli raising the suspicion of gorlin-goltz syndrome. Thus the patient was closely examined for any basal cell nevus or carcinoma. An asymptomatic infra-auricular ulcer was detected which was present there for over a year. It was excised with adequate margins and on histopathological examination showed features of basal cell carcinoma. Also multiple nevi were present at the back. (Figure-1) Chest X-ray PA view showed no skeletal abnormalities. No family history of facial swellings and basal cell naevi was present.

### Case 2

A 16 year old boy presented with left facio-maxillary swelling for 3 years. CT scan face showed multiple odontogenic keratocysts in both maxilla and mandible and calcifications were seen in falx cerebri (Figure-2). Chest X-ray showed the classical picture of bifid and fused ribs. All these findings confirmed the presence of gorlin-goltz syndrome. Complete clinical examination was done to look for other features of the syndrome. No nevi or basal cell carcinoma were present.

### Case 3 and 4

A 32 year old lady and her 12 year old son presented with facio-maxillary and mandibular swelling. CT scan showed multiple odontogenic keratocysts and calcification of falx cerebri and tentorium cerebelli. Both cases had multiple basal cell nevi. The boy had bifid ribs in the chest X-ray. (Figure-3)

## DISCUSSION

In 1894, Jarish reported the first case of Gorlin-Goltz syndrome.<sup>1</sup>

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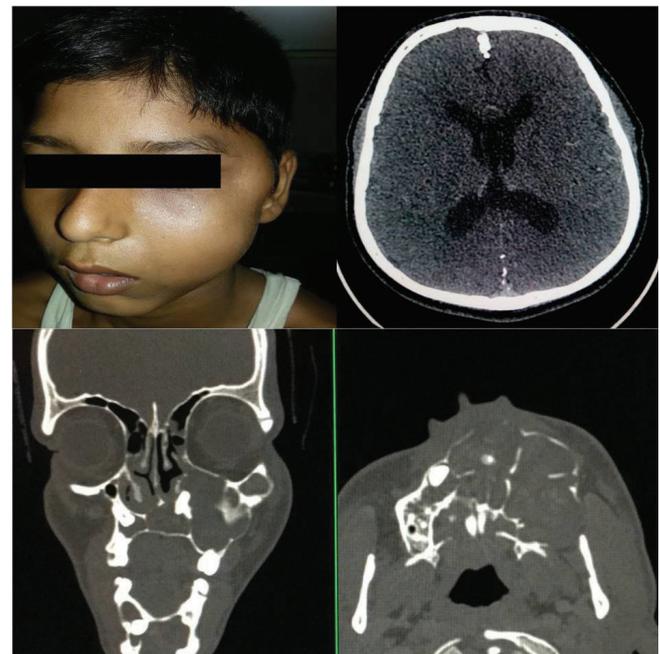
Gorlin and Goltz in 1960 gave the complete description and of the new syndrome.<sup>1</sup> The Clinical features of Gorlin-Goltz syndrome arises at the first, second or third decade.<sup>2</sup> The syndrome has various other synonyms viz. basal cell nevus syndrome, Gorlin syndrome, nevoid basal cell carcinoma syndrome, hereditary cutaneo mandibular polyonocosis, syndrome of jaw cysts, or jaw cyst - basal cell nevus - bifid rib syndrome.<sup>3,4</sup> The term nevoid basal cell carcinoma syndrome was suggested by Gorlin, however all affected adults did not have basal cell carcinomas. Gorlin-Goltz syndrome has an autosomal dominant mode of inheritance, but can have sporadic presentation, or can have a variable phenotypic penetration as in our cases.<sup>5</sup>

Keratocystic odontogenic tumor or odontogenic keratocyst is usually the first feature of the syndrome. The tumor is typically found as incidental radiographic findings or may present as jaw swellings. The presence of multiple OKCs alone are usually confirmatory of the syndrome.<sup>6</sup> Although benign, the recurrence rate after excision of OKC is very high, ranging from 12 to 62.5% and multiple recurrences are not unusual.<sup>7</sup> The PTCH 1 gene, the human homologue of the Drosophila segment polarity gene, has been seen to be involved in the development of Gorlin-goltz syndrome.<sup>8,9</sup>

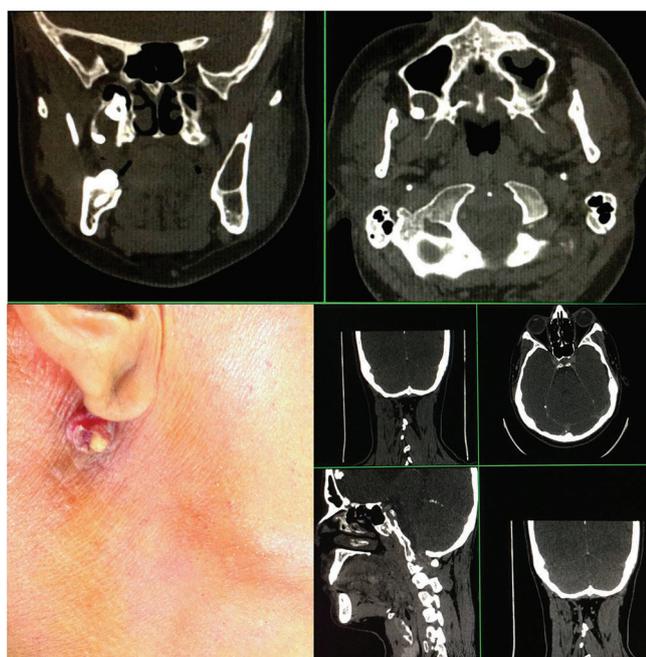
The first case of odontogenic tumors with incidental intracranial

falx calcification led to identification of the syndrome in our centre and a thorough clinical examination helped us detect an asymptomatic basal cell carcinoma. This furthermore made us vigilant for surveillance of any more cases.

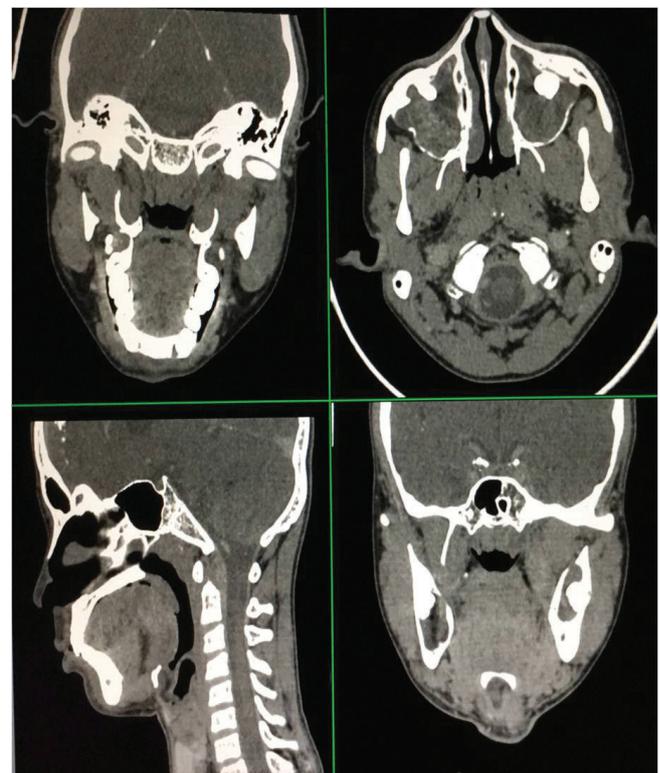
Major criteria	Minor criteria
Multiple bcc	Macrocephaly
Odontogenic keratocyst	Congenital malformation
Palmar/ plantar pits	Skeletal anomaly
Calcified falx cerebri	Radiologic anomaly
Bifid/ fused rib	Ovarian fibroma
1 degree relative	Medulloblastoma
At least two major or one major and two minor criteria should be present <sup>7,9</sup>	
<b>Table-1: Criteria for diagnosis</b>	



**Figure-2:** (Clockwise from top): Clinical photograph showing maxillary swelling left side; Axial CT scan of brain showing calcification of falx cerebri; Coronal and axial CT scans of face showing multiple odontogenic keratocysts



**Figure-1:** Clockwise from top: Coronal and axial scans of CT scan face showing multiple odontogenic keratocysts of maxilla; Coronal, axial and sagittal CT scan of brain showing calcification of falx cerebri; Clinical photograph showing post aural basal cell carcinoma.



**Figure-3:** CT scan images (sagittal, axial and coronal) showing multiple expansile, lytic lesions with internal hyperdense content, seen involving both mandible and maxilla with associated impacted tooth suggestive of multiple Odontogenic kerato cyst, associated calcification of falx and tentorium was also seen.

Odontogenic keratocystic tumors in Gorlin-Goltz syndrome comprise unilocular or multilocular radiolucencies of the mandibular body, angle, or ramus.<sup>2</sup> In children and adolescents, the cysts may cause displacement of developing teeth and delayed dental development with associated impacted tooth.<sup>7</sup> The skin lesions associated with Gorlin-Goltz syndrome are cutaneous basal cell carcinomas, palmar and plantar keratosis or pits and benign dermal cysts.<sup>2,7</sup> Ectopic calcification of falx cerebri, tentorium cerebella, and bridged sella may also be detected radiologically.<sup>7</sup> The patient usually have cranio-facial anomalies comprising of frontal and parietal bossing and broad nasal root which may be associated with ocular hypertelorism.<sup>2</sup> Thoracic cage anomalies such as bifid and fused ribs may be present as classically seen in two of our cases. Syndactyly or polydactyly of toes may be the other skeletal abnormalities along with kyphosis and scoliosis.<sup>2</sup>

The diagnosis of Gorlin-Goltz syndrome requires the presence of two major or one major and two minor criteria<sup>7,9</sup> (Table-1).

In the present cases, the following major and minor criteria were present: histologically proven keratocystic odontogenic tumors of the jaws, calcification of the falx cerebri, bifid ribs, Nevoid basal cell carcinoma, scoliosis along with other findings.

The clinical management includes surgical treatment (enucleation and peripheral ostectomy) of the lesions.<sup>10</sup> Addressing the risks associated with syndrome, the development of neoplasm's on sun or radiation exposure, recurrent odontogenic keratocysts etc., warrants utmost importance. Thus a regular follow up, interdisciplinary cooperation for the diagnosis, treatment and rehabilitation is required.

All the patients were counseled regarding the syndrome and are kept under active follow-up/surveillance for early detection of cutaneous malignancies and other sequelae of the syndrome.

## CONCLUSION

The understanding of the syndrome is very necessary for early diagnosis and management of cutaneous tumours associated with the syndrome. Prognostication of the patients regarding the notoriety of the Odontogenic keratocysts for recurrence. The patients affected by Gorlin-Goltz syndrome must be evaluated by a multidisciplinary approach. Appropriate genetic counseling should be provided once the genetic mutation has been confirmed. Early detection helps reducing the severity and complications of Gorlin-Goltz syndrome including malignancy.

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