CASE REPORT

The dental management of troublesome twos: renal tubular acidosis and rampant caries

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SUMMARY

Renal tubular acidosis is a group of disorders in which there is metabolic acidosis due to defect in renal tubular acidification mechanism to maintain normal plasma bicarbonate and blood pH. Irrespective of organ system involved, oral cavity often reflects the disease occurring anywhere in the body. Thus congenital chronic renal diseases, causing acid–base disturbances affects development and structure of the teeth. Chronic renal tubular acidosis causes enamel defects, dental caries, oral candidiasis, angular cheilitis, etc. We hereby present an unusual case report of a 4-year-old boy suffering from renal tubular acidosis associated with rampant caries, whose full mouth rehabilitation has been done.

BACKGROUND

One of the main functions of human kidneys is to maintain normal levels of acids and bases in the body. Body's cells use chemical reaction to convert food into energy and generate acid. Some amount of acid in blood is normal but excess acid causes acidosis.[1] Renal tubular acidosis is a medical condition that involves accumulation of acid in the body due to failure of kidneys to appropriately acidify the urine.[2] It was first described by Lightwood in 1936.[3] There are four types of renal tubular acidosis, type 1 is distal renal tubular acidosis; type 2 is proximal tubular acidosis, type 3 is combination of type 1 and 2 and type 4 is hyperkalaemic renal tubular acidosis.[3]

Clinical profile of patients suffering from renal tubular acidosis includes short stature, failure to thrive, growth retardation and sometimes rickets in children.[4] Oral manifestations include enamel defects, oral candidiasis, angular cheilitis and dental caries are seen in 65% of patients.[5]

The odontoblasts are partly under the same metabolic regulation as the osteoblasts and therefore the formation of the bone and the dentine are probably regulated by similar factors. Thus there is a reason to assume that the changes in acid–base balance have effects on dentine metabolism as they do on the bone. Bäckman *et al*[6] found that chronic metabolic acidosis slowed down the rate of dentine formation and the general body growth in the young rats. Winsnes *et al* found that congenital persistent proximal type renal tubular acidosis causes enamel defects, enamel hypoplasia and peg-shaped teeth.[6]

We hereby present an unusual case report of a 4-year-old boy suffering from rampant caries associated with renal tubular acidosis, whose full mouth rehabilitation has been done.

Figure 1 Preoperative intraoral photograph.

CASE PRESENTATION

A 4-year-old boy visited Department of Pedodontics, with the chief complaint of pain in right lower back region of mouth since 2 weeks. His diet history revealed 1 year breast feeding with no bottle feeding and no at-will feeding. His medical history revealed that the child had distal renal tubular acidosis with cross fused ectopic kidney, that is, only one kidney functioning normally and the other was ectopically placed and non-functioning. The boy was on alkali therapy viz. four tablets of sodamint (sodium bicarbonate) 300 mg, four times daily. The child presented no familial history of any renal disorders. Intraoral examination revealed complete deciduous dentition with deep dental caries involving pulp in all maxillary teeth and all mandibular molars, that is, irreversible pulpitis with 51, 52, 53, 54, 55, 61, 62, 63, 64, 65, 84, 85, 74 and 75 (figures 1–3). Proximal dentinal caries affected mandibular anteriors, that is, 81, 82, 83, 71, 72, 73 (figures 1 and 3).

INVESTIGATIONS

Intraoral periapical radiographs of 53, 52, 51, 61, 62, 63, 54, 55, 64, 65, 74, 75 and 84, 85 revealed dental caries approaching pulp (figures 4 and 5).

Figure 2 Preoperative photograph of maxillary teeth.

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Figure 3 Preoperative photograph of mandibular teeth.

DIFFERENTIAL DIAGNOSIS

Based on clinical and radiographical features, a provisional diagnosis of rampant caries was made with differential diagnosis as early childhood caries.

TREATMENT

Full mouth rehabilitation was planned for the child but the treatment approach was completely different as the child was suffering from renal tubular acidosis and cross fused ectopic kidney. On consulting patient's nephrologist, patient was anticipated to have reduced resistance to infection so prophylactic antibiotics were given prior to endodontic therapy. Standard procedures of sterilisation were employed to prevent cross infection. Bleeding tendency was excluded prior to administrating local anaesthesia and thus all routine blood investigations were

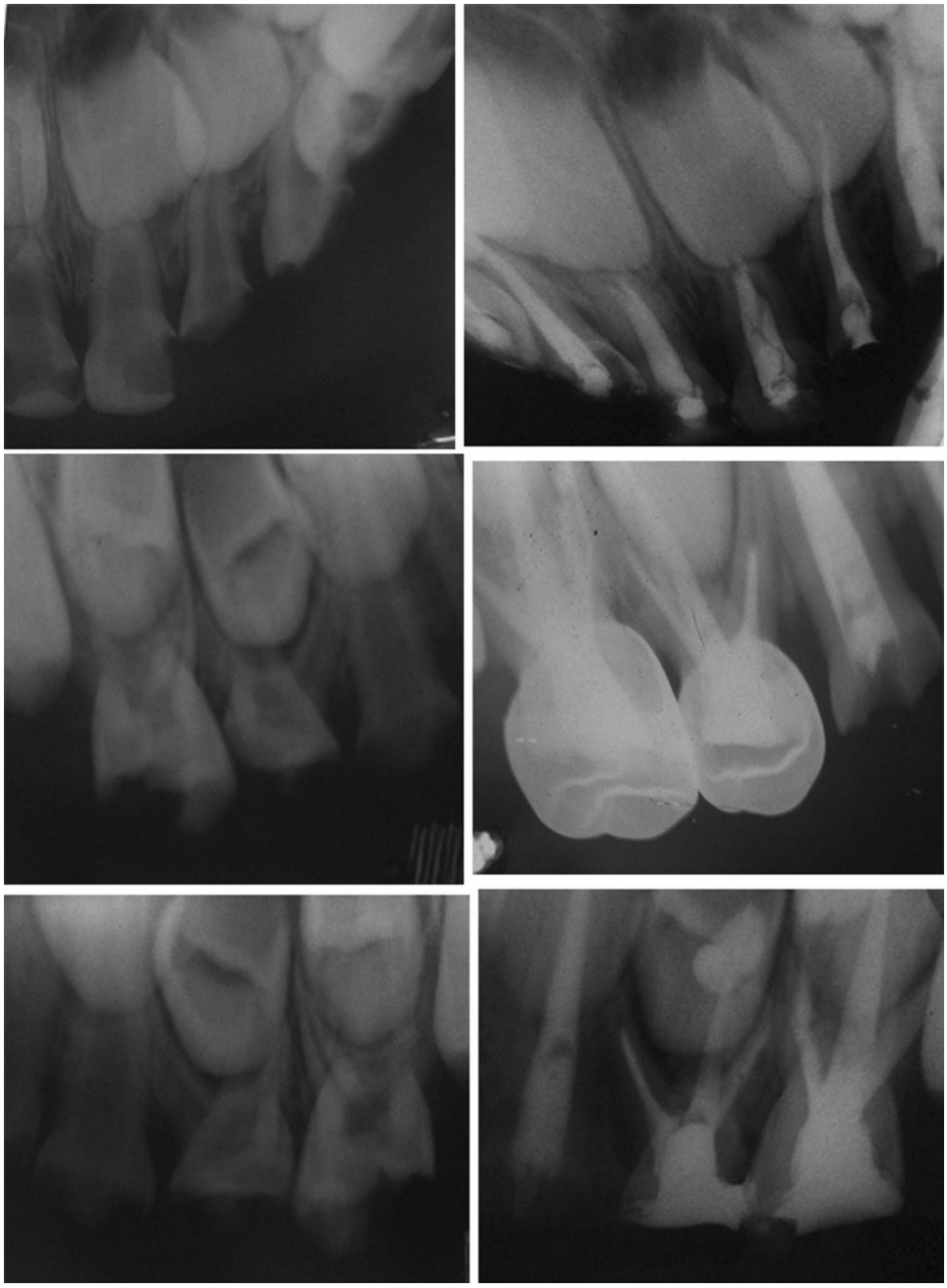

Figure 4 Preoperative and postoperative intraoral periapical radiographs of maxillary teeth.

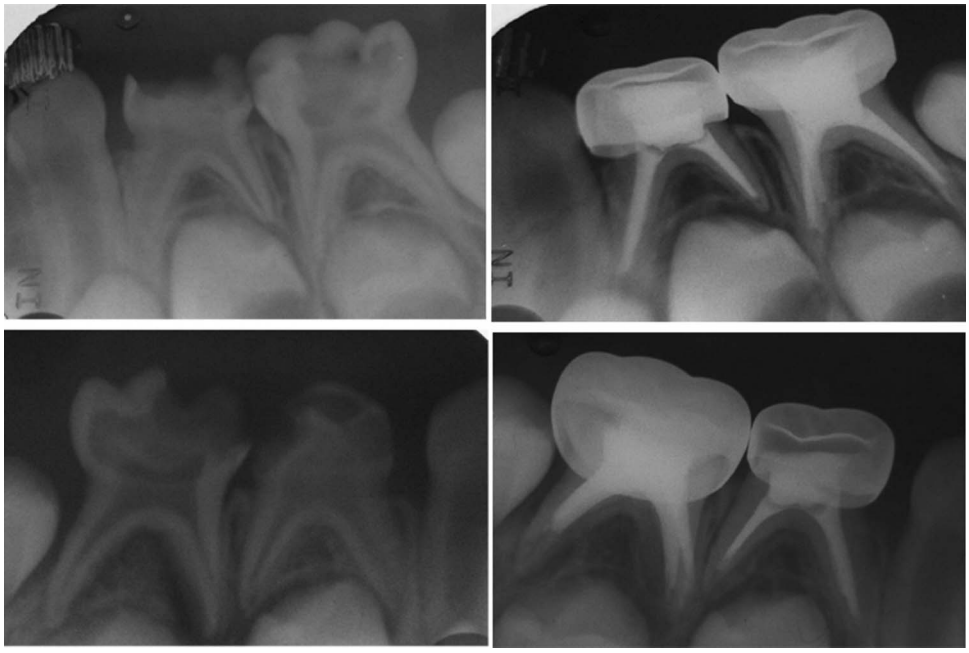

Figure 5 Preoperative and postoperative intraoral periapical radiographs of mandibular molars.

done and were found within normal limits. Non-steroidal anti-inflammatory drugs were avoided and paracetamol was given to relieve pain whenever necessary.

Pulpectomies were done with all the maxillary teeth and mandibular molars using metapex. Stainless steel crown were given to all molars and strip crowns to maxillary anteriors (figures 4–8). Fibre reinforced glass ionomer cement restorations were done with all the mandibular anteriors (figures 7 and 8). So with all these precautions complete mouth rehabilitation was done which not only improved the aesthetics and functional ability of oral cavity but also boosted the psychological component and instilled a positive behaviour in the child towards dentistry.

OUTCOME AND FOLLOW-UP

Patient is under regular follow-up for any secondary caries and also for maintenance of oral hygiene and health.

DISCUSSION

Renal tubular acidosis is a group of transport defects secondary to reduced proximal tubular reabsorption of bicarbonate; the distal secretion of protons or both, resulting in impaired capacity for net acid excretion and persistent hyperchloremic metabolic acidosis.[7]

Changes in acid–base balance during the primary dentinogenesis would cause changes in the calcium metabolism and collagen formation of odontoblasts.[6] Koppang *et al* reported enamel hypoplasia in the permanent teeth of patients suffering from congenital persistent renal tubular acidosis of proximal type. Delayed shedding and eruption, agenesis of permanent teeth and retarded tooth development were also reported.[8]

Acid–base balance also affects the fluoride metabolism. Mineralisation defects in the enamel of rats and dogs, resembling fluorosis, have also been found in acidosis without an exposure to fluoride.[9]

Renal tubular acidosis has also been reported in patients suffering from HIV infection with advanced disease.[10] Also association of renal tubular acidosis with Sjogren's syndrome has been reported, and the prevalence was 2–67%.[11] Sampathkumar *et al*[5] also reported that 65% of patients with renal tubular acidosis suffer from dental caries.

Above mentioned all the studies and reports indicate that patients suffering from acidosis may have some kind of dental health disturbances. Also in our case, the boy was suffering from metabolic acidosis with cross fused ectopic kidney and this could have been the cause for his rampant caries. Thus maintaining the oral health is of prime importance for any child suffering from metabolic acidosis.

Figure 6 Postoperative photograph of maxillary teeth.

Figure 7 Postoperative photograph of mandibular teeth.

Figure 8 Postoperative intraoral photograph.

Learning points

- As oral cavity is the mirror of general health, the dentist should be able to identify the oral manifestations of systemic diseases and treat accordingly.
- Dental treatment should not only be restricted to the restorations of carious teeth but also should extend towards the expected complications during the treatment.
- Children with renal tubular acidosis may have anaemia, bleeding tendencies, hypokalaemic reactions to non-steroidal anti-inflammatory drugs, so precautions should be taken while administrating local anaesthesia, performing extractions and while prescribing analgesics and antibiotics.
- A proper dental approach can improve the quality of life and prolong the life expectancy of such patients.

Contributors All authors have made an individual contribution to the writing of the article and not just been involved with the patient's care. They had substantial contribution to the following: conception and design, acquisition of data and interpretation of data; drafting the article or revising it critically for important intellectual content; final approval of the version published.

Competing interests None.

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