# Nasotracheal intubation: an unusual cause of palatal perforation in an insulin dependent diabetes mellitus patient

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*A case of palatal perforation occurring in 7-year-old girl with IDDM due to nasotracheal intubation is reported. The child, who was not previously diagnosed of IDDM, was brought to hospital in comatose stage and was put on nasotracheal tube for maintaining respiration. This paper highlights the link between IDDM and palatal perforation communicating the nasal cavity due to naso-tracheal intubation.*

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## INTRODUCTION

The palatal perforation creates a communication between the oral cavity and nasal cavity or the maxillary sinus. A number of local and systemic factors could be attributed to palatal perforation. It could be caused due to cysts, tumors or because of trauma.[1] In case of adults, palatal perforation is created by faulty denture with rubber disc.[2] Systemic infections like syphillis[3], leprosy[4] and AIDS[5] have also been attributed for creating a perforation. Local infection causing perforation includes deep mycoses by histoplasma capsulatum and cryptococcus neoformans,[6] mucromycosis[7] and maggots.[8] Palatal perforation could also be caused by cocaine abuse.[9] A case of large rhinolith leading to palatal perforation has also been reported.[10]

The present report describes an unusual case of palatal perforation in anterior hard palatal region communicating with nasal cavity in a patient with IDDM. The child parents were unaware that the patient is suffering from IDDM. Palatal perforation resulted following placement of nasotracheal tube in the child, when she was bought to hospital in comatose condition.

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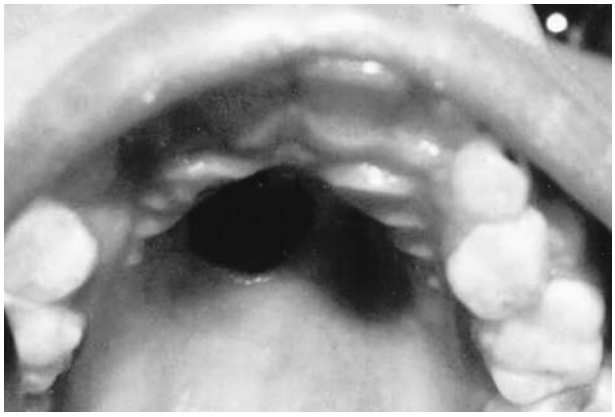

Figure 1. Intra oral photograph showing palatal perforation in anterior palatal region 1x1 cm in size with clear margin. margin.

## CASE REPORT

A 7-year-old female patient with nasal regurgitation was referred to Dental College, by the pediatrician for correction of palatal defect (Figure 1) in the anterior palatal region. Patient chief complaint was nasal regurgitation. History taken from the parents revealed that before 15 days, she was admitted to pediatric hospital for high-grade fever in comatose condition. She was intubated through nasotracheal tube for 4 days. Blood examination showed ESR-100mm, random blood glucose was 260-mg%, with parallel urine sugar 2.5 gm% with ketone bodies, blood urea was 20 mg%. This led to diagnosis of IDDM. Patient was put on bovine insulin. On day 7, she developed a palatal ulcer, a plantar ulcer (Figure 2), a scalp ulcer in occipital region (Figure 3) and ulcer on right side of the back. (Figure 4).

Even though, ketone bodies were controlled, the blood sugar was still high, hence, the child was put on high doses of human insulin with periodic blood-glucose monitoring. The pressure ulcers started healing, however, palatal ulcer persisted. Oral palatal ulcer and

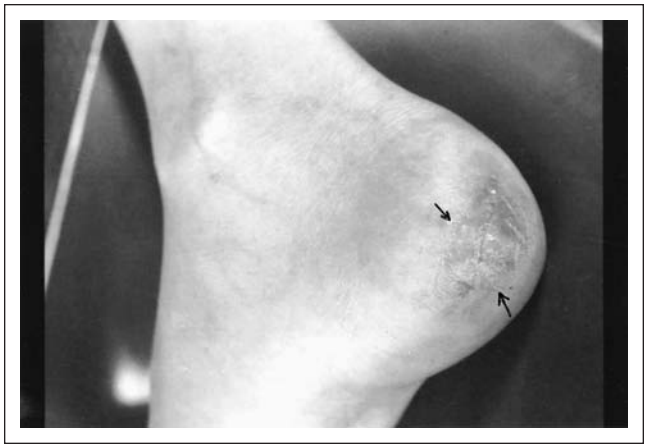

Figure 2. Healing plantar ulcer on medial aspect of heel.

ulcers at other sites were treated with local debridement and daily application of Bacitrain and Betadine ointment. In addition palatal lesion was treated with local application of Nystatin. Systemically patient was put on antibiotic Inj Amoxycillin 500mg and Inj Gentamycin 40 mg twice daily for one week.

After 12 days patient was put on plain 20U Insulin, before breakfast and lunch, plain 10U plus Lente 20U Insulin was administered before dinner after monitoring blood glucose. Although the blood glucose was controlled, she developed palatal perforation in the anterior hard palatal region with clear margin about 1x1 cm in size. Palatal perforation was treated with palatal obturator to restore function and speech.

**DISCUSSION**

Diabetes mellitus is a multifaceted disease and may be a combination of several different diseases characterized by hyperglycemia.[11] Insulin dependent diabetes mellitus (IDDM) accounts for 5-10% of diabetes. Both environmental and genetic factors contribute in the development of IDDM. Known environmental factors include diet, viral exposure in early childhood and certain drugs. The disease process involves irreversible destruction of insulin producing islet cells in the pancreas by the immune system of the body (pancreatic islet cell antibodies), probably as a result of an interaction between infection and an abnormally genetically programmed immune response.[12]

IDDM is immune mediated. Children suffering from IDDM manifest features in early adolescence. They develop absolute insulin deficiency and are prone to ketoacidosis. This often leads to the initial diagnosis of IDDM[12]. The current case also presented with the IDDM in early adolescence and was diagnosed of this metabolic disorder as random blood sugar level in unconscious state revealed elevated levels.

IDDM group of patient are at high risk for developing candidiasis (92% carrier state) compared to control

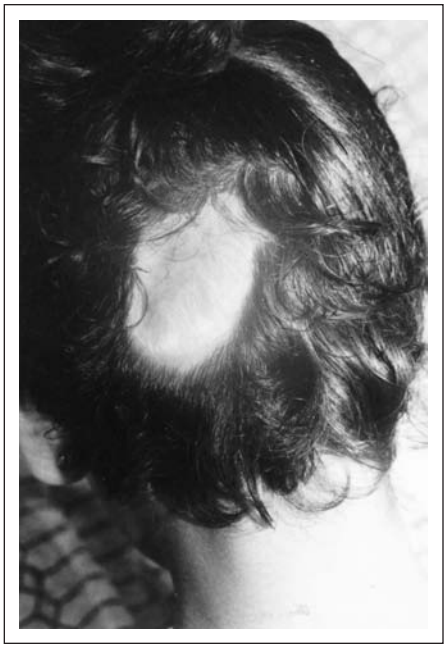

Figure 3. Healed scalp ulcer on occipital region with alopecia.

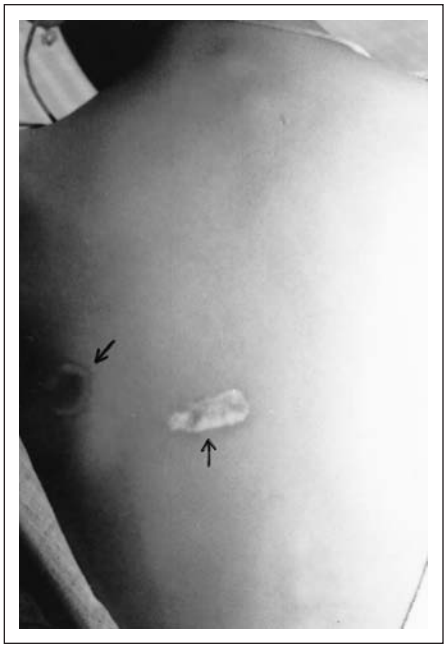

Figure 4. Healing pressure ulcer on the right side of the back.

group (16% carrier state),[13] hence in our patient, the palatal lesion was also treated by topical antifungal drugs.

Diabetic patients are more prone for microbial and opportunistic infections. Basement membrane is thickened due to due to atheromatous deposits in the lumen of blood vessels. Thickened basement membrane impairs leukotactic response and there is a decrease in PMNL microbial ability and failure to deliver the humoral and cellular component of immune system.[14]

Further wound healing is compromised due to decreased collagen production, increased collagenase activity, decreased mitogenic activity of platelet and advanced glycation end products (AGE).[15,16]. Inflammatory reactions are also greater in diabetic state and increased local inflammation causes an intensification of diabetes with rise in blood glucose placing the patient in an uncontrolled state.[14,16] This often requires an increase in insulin dosage or therapeutic adjustment.

The above mentioned factors could have been responsible for formation of a perforation in our case. As diabetes was in uncontrolled state trauma from endotracheal intubation must have led to development of palatal lesion and localized infection and inflammation in that area. Further anterior maxillary region is reported to be relatively cooler than rest of oral cavity under fairly wide range of conditions,[17,18] this factor again must have favored the growth of microorganisms. Lastly continued growth of organism in the palatal ulcer region with impaired defense mechanism and delayed wound healing would have resulted in localized necrosis of soft tissue and bone destruction thus creating a perforation.

Previously cases have been reported[19] wherein the pressure from oral-endotracheal tube on developing palate has resulted in palatal groove formation, a high arched palate, posterior cross bite, enamel hypoplasia and poor speech intelligibility. Palatal grooving may be caused by inhibition of tongue forces on the lateral palatine shelves. Enamel hypoplasia is probably due to traumatic intubation. Impingement of oro-tracheal tube on alveolus rather than on palate may cause alveolar grooving, which may cause dilaceration of primary teeth.[19]

This paper highlights the potential risk of perforating palate in uncontrolled diabetic children with nasotracheal tube. Anesthetists and general surgeons must be made aware of the risk. Initial local debridement with antibacterial and antifungal drugs should be done and systemic antibiotic given. A palatal obturator should follow this. To avoid palatal perforation, excessive pressure on maxillary alveolus should be avoided. An appliance should be fabricated to secure oral tube and protect palate and alveolus.[19]

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