

the stool, or of the child in the act of swallowing these materials. A barium meal will show a gastric filling defect. After the meal has left the stomach some barium usually remains adherent to the surface of the bezoar producing a mottled shadow of variable density. Once diagnosed, the surgical removal is indicated. The child's mental and psychological status should be evaluated.

Acknowledgement

The authors are extremely grateful to Maj Gen KP Saksena, Commandant Command Hospital (North Command) for his encouragement and guidance in publishing this case.

Phytobezoars in Infants

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Phytobezoars are compact masses of undigested vegetable materials including fibres, skins, seeds, leaves, roots or stems of plants (phyton) glued together inside the stomach(1). In extensive reviews by Debakey and Ochsner(2,3), most of the cases of phytobezoars were found to be due to the ingestion of persimmon fruits. Other unripe

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fruits like oranges, prunes, coconuts, etc. are also known to be associated with the formation of bezoars and concretions(4). Kendu fruits, found in many parts of India have been reported to be the probably cause of phytobezoars in some cases(5,6).

Phytobezoars are not considered common in children and because of its relative rarity, the diagnosis is often overlooked(7). Three cases below the age of one year fed on milk, rice bran and bananas only are reported here.

Case Reports

Case 1. A male baby aged 11 months presented to us with a swelling in the upper abdomen and vomiting of one month duration. On examination, the baby was anemic, malnourished and irritable. There was a smooth lump in the epigastrium, mobile from side to side and firm in consistency. Plain X-ray of the abdomen showed a soft tissue opacity in the region of the stomach.

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Received for publication: September 16, 1992;

Accepted: July 8, 1993

Barium meal study was suggestive of an intragastric mass. Hence, a clinical diagnosis of gastric bezoar was made. Exploratory laparotomy was done, and an intragastric mass taking the shape of the stomach was extracted through a wide gastrotomy. The mass was dirty brown in color, somewhat friable, foul-smelling and consisted of undigested vegetable materials. The child recovered and is gaining weight and feeding normally during subsequent follow-up.

Case 2. A seven-month-old male infant was brought with the history of not feeding well and failure to gain weight. The baby had been fed with rice bran mixed with milk and bananas since the age of 3 months. On examination, there was a firm, smooth lump in the epigastrium, mobile from side to side. Plain X-ray of the abdomen showed a soft tissue opacity in the region of the stomach. The possibility of bezoar stomach was considered in view of the previous experience, and laparotomy was performed without any further investigations. A similar intragastric mass was found and was removed. The baby recovered well and soon started feeding normally.

Case 3. A four-month-old baby was admitted with the history of swelling of the upper abdomen and vomiting of 15 days duration. The baby was feeding normally with breast milk supplemented with cow's milk and, recently, with bananas. On examination, the baby was anemic and irritable. There was a firm, smooth mass in the epigastrium extending to the left hypochondrium, mobile from side to side. Plain X-ray abdomen showed a soft tissue opacity in the epigastrium. Exploratory laparotomy revealed an intragastric mass conforming to the shape of the stomach (*Fig.*). The mass was removed, and the baby recovered well after surgery.



Fig. Specimen of phytobezoar removed at laparotomy. The mass has taken the shape of the stomach.

Qualitative biochemical analysis of the masses showed cellulose, hemicellulose, lignin and tannin as the main constituents.

Discussion

“Bezoars” were known since ancient times when they were thought to be having therapeutic value, as the term was probably derived from the Persian word “Pedzahr”, meaning an antidote against poisons(8). Ingestion of the unripe persimmon fruit is considered to be the main cause of phytobezoars. Another type of bezoar is caused by ingestion of hair, and is called trichobezoar. In the study conducted by Halloway *et al.*, persimmon phytobezoar was composed of approximately 11% cellulose, 2% lignin and 5% hemicellulose(4). They postulated that in the unripe fruit such as persimmon, high concentration of catechins and leucoanthocyanins are present which are tannin mono-

mers. When these come in contact with gastric hydrochloric acid, polymerization takes place. The tannins act as cementing agents to form a firm insoluble mass of cellulose, hemicellulose, proteins, glycoproteins and tannins. These substances are found in many other common fruits and vegetables and may contribute towards the formation of phytobezoars.

In Indian literature reports of phytobezoars are not many. Chakrabarty and Rao(5) reported two cases of phytobezoars probably due to the ingestion of "Kendu" fruits. Patro *et al.*(6) reported a similar case. Sen *et al.*(9) and Mittal(10) have reported isolated cases of phytobezoars occurring as a result of ingestion of various vegetable materials. Deb *et al.*(11) reported a case of phytobezoar obstruction due to ingestion of jackfruit. Chakrabarty *et al.*(5) have coined the term "Kendubezoar" for their cases. Kendu trees known for their leaves for making 'Bidis' are grown in several states of India. Like the persimmon trees, they also belong to the genus "Disopyrus". The trees bear small orange-yellow fruits, which are eaten raw by the children.

In none of these reports, infants below the age of one year were affected by this condition. Banana, as a cause of phytobezoar, has not been implicated earlier. All three of our cases were infants, and were fed with cow's milk, and bananas were added as semisolid feeds. These bananas commonly grown in Assam are of particular variety having large seeds. The seeds are usually discarded and the outer part of the fruit, mashed with milk to make a semisolid feed, is given to the babies from a very early age. This is a common practice in the rural areas of Assam, and it makes a cheap but nutritious diet for the babies in the rural poor community. All three cases in our series had similar feeds from early infancy. All of them

belonged to the same geographical area and community.

The usual symptoms of phytobezoars are abdominal pain, anorexia, vomiting, anemia and malnutrition of varying degree(12). Less commonly obstruction and even perforation may occur. In all our cases abdominal lump was the prominent presenting feature. The radiological signs of phytobezoars are soft tissue opacities on plain X-ray of the abdomen and barium meal study revealing a large filling defect conforming to the gastric outline(10).

Treatment of this condition remains surgical removal. Lee *et al.*(13) reported the use of the enzyme cellulase to disintegrate phytobezoars successfully. In none of our cases we have tried enzymatic disintegration of the masses.

Acknowledgement

The authors are grateful to the Department of Pharmaceutical Sciences, Dibrugarh University, for undertaking the qualitative chemical analysis of the phytobezoars.

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Abdominal Tuberculosis in Children: Experience Over a Decade

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ABSTRACT

This presentation deals with 110 surgically proven cases of abdominal tuberculosis in the pediatric age group. The protean clinical profiles and complications of the disease entity made the clinical diagnosis difficult; the investigations were also found non-pathognomonic. The most common type of pathology seen was adhesive variety followed by nodal type. Strictures of the small bowel were uncommon and hyperplastic variety was rarely seen in the present series. The pathogenesis relating to various varieties has been suggested based on the vast experience from a single institution.

Key words: Tuberculosis, Abdominal tuberculosis.

Despite considerable progress made in therapy and prophylaxis during the last quarter of the century, tuberculosis of various sites continues to be a major health problem in India. The disease is completely under control in the developed countries. However, for this very reason research on the various aspects of the disease has slowed down considerably.

Various series comprising adult cases of abdominal tuberculosis have been reported(1,2) but there is paucity of literature on this disease in children. This could be related to a relative rarity of the disease in the pediatric age group. Narasimha Rao *et al.* saw only 56 cases over a period of 15 years in a premier institution at Chandigarh(3).

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*Received for publication: August 31, 1992;
Accepted: July, 5, 1993*