Neonatal duodenal obstruction: a review of 30 consecutive cases*

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Abstract. Delayed return of normal duodenal function necessitating a prolonged hospital stay may often follow operative treatment of neonatal duodenal obstruction (NDO). Previously suggested ways to improve the operative result include variations in the anastomotic technique, duodenal tapering, and the omission of gastrostomy. We have analysed the experience at the Prince of Wales Children's Hospital of 30 consecutive cases of NDO treated over a 7-year period (1984-1990) in order to define factors in the treatment that might influence the establishment of oral feeding and duration of hospital stay. There were 19 males and 11 females, with duodenal atresia occurring in 10 and extrinsic or intrinsic causes of duodenal stenosis in the remaining 20. Two patients died without operation. Corrective procedures included 17 duodenoduodenostomies, 9 duodenoplasties, and 2 patients had lysis of Ladd's bands that produced duodenal obstruction from the time of birth. Only 1 patient underwent duodenal tapering. There were 20 gastrostomies performed according to the preferences of the primary-care surgeons. It was shown that the duration of establishing oral feeding and hospital stay were not influenced by the type of corrective procedure, although Ladd's bands duodenal obstruction was associated with the shortest hospital stay. The use of a gastrostomy was related to higher morbidity, a longer period to establish oral feeding, and a prolonged hospital stay. Prenatal diagnosis has also emerged as an important influencing factor. It is concluded that gastrostomy should be omitted in the treatment of NDO. The various types of corrective procedures were similar in final outcome in terms of morbidity and total hospitalisation time.

Key words: Duodenal obstruction – Neonatal – Gastrostomy

Introduction

Although first documented by Calder in 1733 [3], the operative management of neonatal duodenal obstruction (NDO) has achieved a large measure of success only since 1941, when fine black silk sutures were introduced in place of heavy catgut in addition to inflating the distal duodenal segment to enable easier anastomosis [14]. More recently, a number of refinements in the surgical management of NDO have been described with the aims of reducing pre- and postoperative morbidity, hastening the return of normal duodenal function, and ultimately reducing hospital stay. These include emphasis on prenatal diagnosis by ultrasonography (US) and variations in the anastomotic technique such as the diamond-shaped duodenoduodenostomy (D-D) described by Kimura et al. [8]. In addition, tapering and imbrication of the proximal, often dilated duodenum [1, 16] and omission of gastrostomy and trans-anastomotic feeding tube [2, 5, 8, 10] have also been advocated.

This study reviewed the experience of NDO management at the Prince of Wales Children’s Hospital (POWCH) and attempted to identify factors that might favourably influence outcome.

Materials and methods

A retrospective study was performed with analysis of the records of 30 consecutive cases of NDO presenting between 1984 and 1990 after a prospective neonatal surgical audit was established at the POWCH in 1984. The epidemiological profile of the sample, the modes of presentation and diagnoses, and the nature of operative management were assessed in order to identify factors that might influence the successful overall management and outcome, reflected by the “yardsticks” of: (1) time to establishment of oral feeding; and (2) duration of hospital stay.

Prenatal diagnoses and associated congenital anomalies were recorded. Information on the anatomical causes of duodenal obstruction was obtained. Intermittent duodenal obstruction or bowel gangrene associated with midgut malrotation and volvulus as a cause of NDO was excluded from this study. The operative management was analysed in terms of the type of operation performed, usage of gastrostomy, and postoperative complications. The overall mortality was also examined.


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Results

Over a 7-year period (1984–1990), there were 30 neonates admitted to POWCH with NDO, 19 males and 11 females. The mean age at admission was 4.3 days. Five babies (16.7%) were premature with gestational ages between 32 and 37 weeks, however, none had a birth weight less than 1,800 g. Twenty (66.7%) of the neonates had associated congenital anomalies: 6 (20.0%) had Down’s syndrome, 9 (30.0%) had cardiac anomalies (principally patent ductus arteriosus and septal defects) that did not require early operation, and 14 (46.6%) had additional bowel abnormalities. Of those with bowel abnormalities, there were 10 with associated midgut malrotation detected at the time of operation, 2 with gastroschisis, 2 with imperforate anus, and 1 with Hirschprung’s disease.

Prenatal US detected abnormalities in 7 fetuses and, of these, the diagnosis of duodenal obstruction was confirmed in 4 cases. Twenty infants presented with vomiting (65% noted to be bilious) and 5 presented with other congenital anomalies that initially masked the presence of NDO.

Fourteen infants were diagnosed by plain abdominal radiogram (AXR) alone with the diagnostic “double-bubble sign”; an additional 13 went on to have a barium meal following AXR. Two cases of NDO were diagnosed at operation during repair of gastroschisis. The principal cause of obstruction in the operated group was duodenal stenosis in 11 cases (36.7%), duodenal atresia (type II atresia) in 10 (33.3%), and duodenal diaphragm/web (type I atresia) in 7 (23.3%). Purely extrinsic compression of the duodenum by Ladd’s bands with no evidence of a midgut volvulus leading to bowel ischaemia accounted for 2 cases. An annular pancreas was noted in 2 infants with duodenal stenosis, in 4 with duodenal atresia, and in 1 with a duodenal diaphragm/web.

The mean time to diagnosis was 4.8 days from birth and less than 24 h from admission to hospital, while the mean time to operative management was 6.5 days from birth, 2.1 days from admission, and less than 24 h from the time of diagnosis (Fig. 1).

Of the 30 infants, 28 underwent operation, with three main types of corrective procedure performed: 17 (60.7%) D-D, 9 (32%) duodenoplasty (D-P), and 2 lysis of Ladd’s bands (L-LB). Ladd’s procedure was performed in all patients found to have an associated malrotation. Tapering of the proximal duodenum was performed in 1 case only. A gastrostomy was used and a trans-anastomotic feeding tube inserted in 20 cases (71.4% of the corrective procedures). There were 12 gastrostomies in the first 14 cases with 8 in the second 14.

Oral feeding was commenced when the volume of gastric aspirate had reduced but had not necessarily become non-bile-stained. The mean time to commencement of oral feeding for the entire group was 13.1 days and mean total hospitalisation was 29.4 days. For the prenatally diagnosed group of 4 patients, the mean time to operation was 2.3 days and, excluding 1 case with severe associated anomalies requiring prolonged hospitalisation, mean total hospitalisation time was 22.3 days.

Figures 2 and 3 demonstrate a comparison of time courses to oral feeding and total hospitalisation times be-