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Congenital duodenal obstruction: a survey of mortality

by

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A review is presented of 31 neonates operated upon for various types of congenital duodenal obstruction during the last twenty years. The detailed and overall mortality was analysed by dividing the material into a ten-year, and two five-year, periods. The mortality rate in the second five-year period (1972—1976) was found to be half that of the ten-year period (1956 to 1965).

The operative technique (duodenoduodenostomy), the use of atraumatic silk sutures and transanastomic feeding tube are probably the most important factors leading to better survival. Most of the surviving patients have been followed up and have so far shown no complaints directly related to the operation.

The considerable progress achieved in the field of neonatal surgery during the last two decades has markedly decreased the high mortality rate following surgical emergencies in the first days of life.

The aim of this study is to analyse the factors of this favourable tendency. In order to approach the problem we have chosen congenital duodenal obstruction, because this anomaly is sufficiently frequent for representing the development in neonatal surgery. The aspects investigated were as follows. Has the mortality rate decreased following surgery for congenital duodenal obstruction. If so, what are the causes of the decrease, and what factors are responsible for the mortality.

Material

In the twenty years from 1956 to 1976, 31 newborn infants under the age of one month have been treated for various forms of congenital duodenal obstruction requiring emergency surgery (atresia, stenosis, annular pancreas, Ladd's band, ligament of Treitz). The main clinical features of the patients are summarized in Table I.

The patient material has been divided into three periods (Table II). In any of these three groups the number of patients was sufficient to allow a comparison in relation to time. At the same time, we did not differentiate between the various forms of congenital duodenal obstruction (intrinsic or extrinsic obstruction, annular pancreas, etc.), as all the cases were surgical emergencies requiring operation in early postnatal life. For estimation of the general condition, we used Waterston's classification [4]. According to this, neonates with a birthweight under 2000 g belonged to

TABLE I

Clinical features of neonates operated upon for various types of congenital duodenal obstruction

	No. of patients	Sex	Operative findings	Weight at birth (g)	Additional malformation	Waterston's classification	Age at surgery (day)	Procedure	Alive/ Day
GROUP I 1956—1965	1.	F	Duodenal stenosis	2350	Rectal and renal agenesis	C	5	duodeno-plasty	died
	2.	M	Duodenal stenosis	2480	—	B	26	d-j	died
	3.	F	Duodenal stenosis	3010	Down's syndrome	A	28	d-j	alive
	4.	M	Duodenal stenosis	4000	Congenital heart disease	B	5	d-j	died
	5.	M	Duodenal atresia	3600	Severe pneumonia	B	11	d-j	died
	6.	F	Duodenal atresia	2200	—	B	4	d-j	died
	7.	M	Annular pancreas with incomplete obstruction	3450	—	A	5	g-j	alive
GROUP II 1966—1971	8.	F	Annular pancreas with complete obstruction	2750	Rectal agenesis	B	1	d-j	died
	9.	F	Duodenal stenosis	3100	Severe malrotation	A	2	d-j	alive
	10.	M	Ladd's band	3600	—	A	11	lysis	alive
	11.	F	Ladd's band	3800	—	A	8	lysis	died
	12.	F	Duodenal atresia	2300	—	B	6	d-j	died
	13.	F	Annular pancreas with complete obstruction	2450	Congenital heart disease, malrotation	C	2	d-j	died
	14.	M	Duodenal stenosis	3000	—	A	5	d-j	alive
	15.	F	Duodenal atresia	2030	Malrotation	C	11	d-j	died
	16.	F	Duodenal atresia	2850	—	A	3	d-j	died
	17.	F	Annular pancreas with complete obstruction	1700	—	C	2	g-j	died
	18.	F	Duodenal stenosis	3200	Down's syndrome	A	21	d-j	alive

GROUP III 1972—1976	19.	M	Duodenal stenosis	3250	—	A	28	d-j	alive
	20.	M	Annular pancreas with complete obstruction	1750	Ectopic heart Extrophic bladder	C	1	d-j	died
	21.	F	Annular pancreas with incomplete obstruction	2580	—	A	27	d-d	died
	22.	M	Duodenal atresia	2400	—	B	7	d-j	alive
	23.	M	Duodenal stenosis	2650	Severe malrotation	B	10	d-j	alive
	24.	M	Annular pancreas with complete obstruction	2050	Down's syndrome, Cong. heart disease	C	5	d-d	died
	25.	M	Duodenal stenosis	3300	Down's syndrome	A	19	d-d	alive
	26.	F	Annular pancreas with complete obstruction	1950	Congenital heart disease	C	5	d-d	died
	27.	M	Duodenal obstr. caused by para-duodenal lymphglands	3150	—	A	18	lysis	alive
	28.	F	Annular pancreas with complete obstruction	2450	Down's syndrome Severe malrotation	C	8	d-d	alive
	29.	F	Duodenal atresia	1550	—	C	3	d-d	alive
	30.	F	Annular pancrease with incomplete obstruction	2850	Severe pneumonia	B	6	d-d	alive
	31.	M	Obstruction caused by thin and narrow ligament of Treitz	3300	Malrotation	A	4	lysis	alive

d-j = duodenojejunostomy
g-j = gastrojejunostomy
d-d = duodenoduodenostomy

TABLE II

Groups of patients according to year of treatment

No of groups	Period	No of patients
Group I (No 1— 7)	1956—1965	7
Group II (No 8—18)	1966—1971	11
Group III (No 19—31)	1972—1976	13

TABLE III

Survival rate in the three groups of patients

	Number of patients			Survival, per cent
	total of cases	survived	died	
Group I (1956—1965)	7	2	5	29
Group II (1966—1971)	11	4	7	36
Group III (1972—1976)	13	9	4	69

TABLE IV

Scoring in the three groups of patients

Waterston's classification	Periods of analysis					
	1956—1965 (Group I		1966—1971 (Group II)		1972—1976 (Group III)	
	No of patients	points	No of patients	points	No of patients	points
A	2	6	6	18	5	15
B	4	8	2	4	3	6
C	1	1	3	3	5	5
Total	7	15	11	25	13	26
Average of points		2.14		2.27		2.00

Group C, between 2001—2500 to Group B, and above 2500 g to Group A. Additional serious malformations or severe pneumonia transferred a full term infant to Group B, and a premature one to Group C. Down's syndrome alone was not considered a danger to life. All the neonates that recovered have been followed up to the present time.

Table III shows the survival rate in the three groups. As can be seen, in the first period of analysis (Group I) less than one third of the neonates survived; while in the last period (Group III) this figure considerably improved as out of 13 only 4 died.

The question arises whether the improvement was the result of favourable condi-

tions (birthweight, maturity, absence of additional anomalies, etc.) of the neonates considered in this study. In order to answer this question we scored the patients; patients belonging to the Group A, B, and C were given 3, 2 and 1 points, respectively (Table IV). According to this the average scores were 2.14, 2.27 and 2.00 in Group I (1956—1965), Group II (1966—1971) and Group III (1972—1976), respectively. This shows that in the third period (Group III) the greatest improvement of survival was achieved in neonates who were in the poorest condition.

The importance of higher birthweight, maturity and the absence of additional malformation(s) is clearly seen if the three time periods are compared according to Waterston's classification. In groups A, B and C a survival rate of 76.9, 33.3 and 22.2 per cent, respectively, was obtained.

The cause of the improvement of survival

As shown above, there has been a remarkable increase of survival in the past five years. This improvement had been reached in infants whose score was somewhat, although not significantly, lower (Group III). However, in Groups II and III (1966—1976) two younger surgeons participated in the management of the infants. Introduction of new surgical methods such as the generally accepted duodeno-duodenostomy, has in all probability largely contributed to the better results obtained in the last five years (1972—1976). The use of the transanastomotic plastic tubing made early feeding possible, and decreased the number of local complications. The availability of fine atraumatic silk suture material also contributed to the safety the single-layer intestinal anastomosis. Finally, the development in pre-, intra- and postoperative management, earlier diagnosis, better transport and the neonatal intensive care unit are all essential factors to be considered when explaining the better results. We are in complete agreement with Miller, who wrote "We believe that these people (neonatologists) have contributed as much to the survival of surgical neonates in the last few years as the surgeons themselves, and we rely on them. This is particularly true in those babies who have a very low weight, four pounds and under." [1]

Table V

Causes of death

Peritonitis	7
Respiratory complication	4
Anastomotic leak	4
Necrotizing enterocolitis	3
Multiple anomalies	3
Septicaemia	2
Aspiration of vomit	1
Thrombosis of abdominal aorta	1

Causes of death

Table V shows the causes which were believed to have led to death. In a few cases two or three post-operative complications or additional malformations were responsible for the fatal outcome (Table V).

Breakdown or leakage of intestinal anastomosis and necrotizing enterocolitis were always associated with peritonitis. These two complications were present in the neonates included in Groups C and B. The cause of death was septicaemia in two infants; one of them died 43 days after surgery despite antimicrobial therapy. Two infants with Down's syndrome died of pneumonia (Table VI).

Follow-up

Of the 15 surviving patients, 13 have been followed up for an average of 5.6 years with a maximum of thirteen years. We were unable to contact two patients who had moved from our area.

Low birthweight, additional anomalies, liability to infections are those risk factors which necessitate a close follow-up of these infants, and which might be the only way to protect them from early and late complications.

Table VI

Data of follow-up

No of patients	Age, years	Body weight, kg	Height, cm	Remarks
3.	17.5	49	150	mild form of Down's syndrome
7.	12.5	35	140	no complaints; abdominal hernia required closure
9.	?	?	?	no data
10.	8	25	130	no complaints
14.	7.5	25	129	abdominal hernia required closure; no complaints
18.				3 months after discharge died of pneumonia
19.	6.5	24	122	Down's syndrome; no complaints
22.	3	14	100	no complaints
23.	2.5	13.5	88	no complaints
25.				4 months after discharge died of pneumonia
27.	1.5	12.5	86	Down's syndrome; no complaints
28.	?	?	?	at age of one year no complaints, since then no data available; Down's syndrome
29.	1.5	11.0	79	poor eater
30.	14 mths	10.0	76	no complaints
31.	8 mths	4.65	53	free intestinal passage but fails to thrive

Comment

We are well aware that the number of patients in this study is very small and our results (especially in the earlier years) are rather modest. We believe, however, that our review is indicative of a promising development.

We are convinced that further progress can only be achieved by establishing large centres with all facilities for complex treatment of surgical emergencies. Creation of paediatric surgical centres for every area of 1.5—2.0 million people could efficiently serve this purpose [2, 3]. In smaller units, the staff will not see enough neonates, infants or children to collect the necessary experience on the one hand, and the expensive equipment will not be made use of, on the other hand.

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