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Case Report

Good Nutritional & Development Milestone Outcomes After Kimura Procedure for Duodenal Atresia Type 1

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Abstract

Congenital duodenal obstruction (CDO) is a condition that commonly occurs in neonates, one of which is duodenal atresia, a type of congenital intestinal obstruction. This condition occurs at an estimated rate of 1 in 5,000-10,000 live births. The prompt and accurate diagnosis can lead to good outcomes. This case report aims to present a 3-day-old female neonate diagnosed with type 1 duodenal atresia, confirmed through anamnesis, physical examination, and supporting examination, namely X-ray showing a double bubble sign. We followed up with this patient regarding the outcomes in terms of weight gain and developmental milestones after the management procedure of duodenoduodenostomy. The patient in this case report showed good nutritional results and development in accordance with their age.

Keywords: Duodenal, Atresia, Kimura, Weight, Development

Introduction

Duodenal atresia is a congenital intestinal obstruction disorder that can present in patients with billous or non-billous vomiting within the first 24 to 38 hours of neonate's life.[1] Congenital duodenal obstruction (CDO) is a common condition in newborns, accounting for up to 50% of all cases of intestinal atresia. Duodenal atresia itself occurs due to the failure of the solid core of the duodenum to undergo recanalization during fetal development.[2] Surgical intervention is the gold standard in the treatment of duodenal atresia, where in 1997, Kimura reported a "diamond-shaped" anastomosis technique that became the management for duodenal atresia.[3]

Duodenal atresia is further divided into 3 types; Type 1 or wind sock type (91%) characterized by a web or membrane diaphragm with intact muscle walls; Type 2, marked by a short fibrous cord connecting both ends or pouches of the duodenum (1%); Type 3 or complete duodenal atresia with both ends blind and completely separated (7%), and sometimes accompanied by annular pancreas. The cause of this occurrence can be linked to vascular anomalies, abnormalities in neural cell migration, and failure of duodenal lumen recanalization, although the exact cause is not yet known.[4] This event can occur in approximately 1 in 5,000-10,000 live births in neonates. Duodenal atresia is a congenital disorder of the digestive system that occurs from the neonatal period, specifically during the embryonic stage when the duodenum undergoes lumen recanalization between the 8th and 10th week of gestation. The incidence of duodenal atresia is associated with an increase in excessive amniotic fluid during pregnancy (polyhydramnios), with 50% of duodenal atresia patients experiencing congenital malformations, including 30% with trisomy abnormalities. 21%, 22% with intestinal malrotation, and 20% to 30% with congenital heart disease.[5]

Bile vomiting after birth is one of the symptoms of duodenal atresia, which occurs due to an obstruction at the hepatopancreatic ampulla. Duodenal atresia can be detected before birth through prenatal

ultrasonography (USG) examination, which shows an enlarged stomach or duodenum, resembling a "double bubble." Therefore, it is important to conduct routine ultrasound (USG) examinations during pregnancy to enable early diagnosis and reduce mortality and morbidity rates.[5] After the diagnosis is established, resuscitation measures are taken by correcting fluid balance, electrolyte abnormalities, and performing gastric decompression. Early postoperative mortality for duodenal atresia repair is reported to be as low as 3-5%, with most deaths occurring due to complications related to associated congenital anomalies. Long-term survival rates are expected to reach 90%.[6] Therefore, this case report aims to highlight the importance of early diagnosis of duodenal atresia cases and how the results of the Kimura procedure, which is diamond-shaped, can be observed through the weight development of a patient.

Case

Referred from Kepulauan Meranti Regional General Hospital, a 3-day-old baby girl complaining of billous vomiting since birth and was taken to the emergency department of Arifin Achmad Regional General Hospital, as shown in **Figure 1**.

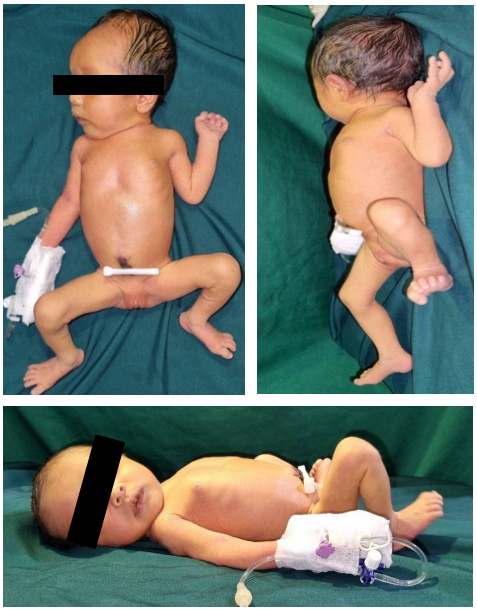

Figure 1. Patient clinical appearance

Based on the baby gram X-ray findings, which revealed a double bubble image, The baby was born via caesarean section due to indications of polyhydramnios and cephalopelvic disproportion (CPD) at a gestational age of 38-39 weeks and a birth weight of 2890 grams. The baby appeared to be struggling with respiratory distress and asphyxia, and immediate resuscitation was performed at the previous hospital. The mother visited antenatal care twice with the obstetrician and was advised that there was excessive amniotic fluid during the pregnancy.

At the Arifin Achmad Regional General Hospital, a babygram X-ray examination was conducted again, revealing a double bubble image, indicative of duodenal atresia **[Figure 2]**.

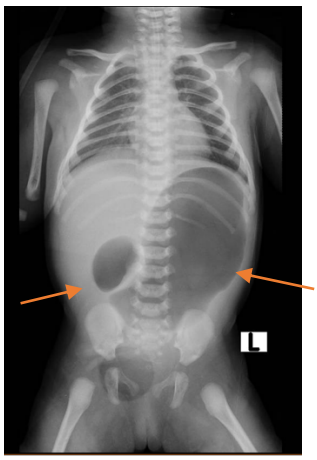

Figure 2. Babygram showed double bubble sign

The Kimura operation was carried out for repair once type I duodenal atresia was diagnosed. In the supine position during the anesthetic stage, antisepsis is performed and a transverse incision is made above the umbilicus to access the peritoneum. Upon exploration, adhesive intestinal tissue is observed between the ascending cecum and the duodenum.

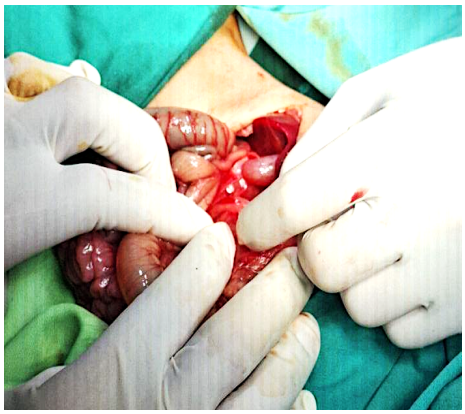

Figure 3. Intraoperative finding of duodenal atresia type 1

No bands are detected. There is no evidence of malrotation. Adhesiolysis was carried out to facilitate further identification. The stomach and second part of the duodenum are dilated, indicating a slight obstruction with pressure noted distal to the Type I duodenal atresia (referred to as wind shock). Duodenoduodenostomy-diamond-shaped was performed, ensuring good flow, no leakage, and the

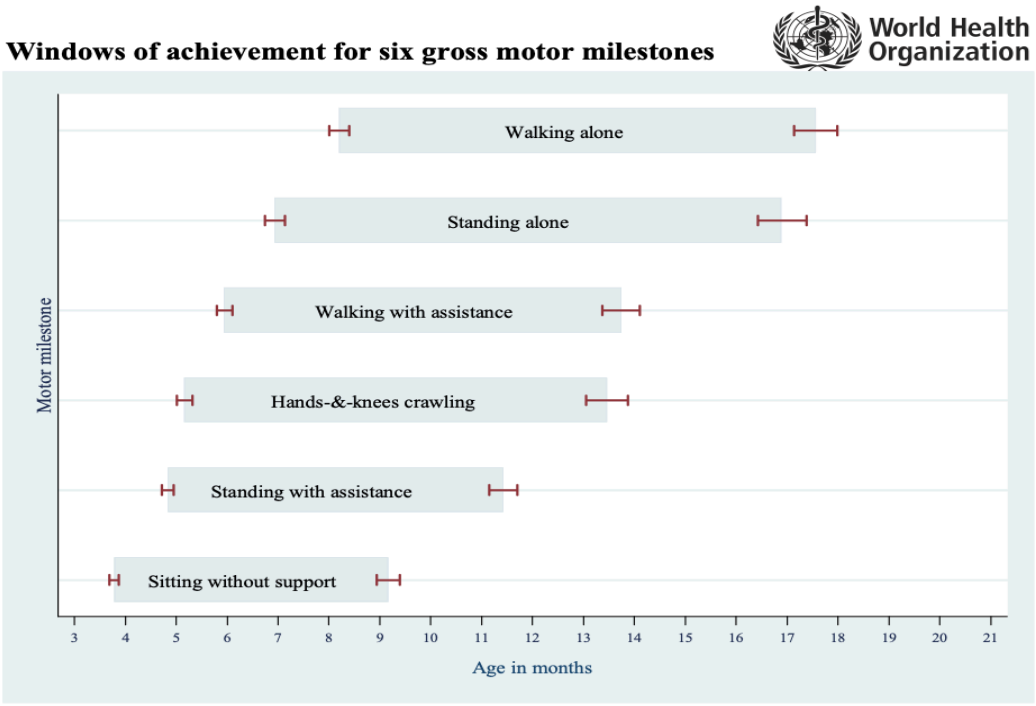

Figure 4. Patient's developmental milestones according to WHO

presence of viable tissue. Bleeding is controlled, and the area is thoroughly washed until clean, allowing for smooth distal flow before the surgical wound is closed. No complication was found in the early postoperative period in this patient **[Figure 3]**.

The patient stayed NPO until no more aspiration was observed, having OGT aspiration every three hours during postoperative care. The patient started getting 10 cc of feeding every three hours and gained post-operative weight of 2.600 grammes. After the operation, fourteen days later the weight rose to 2.810 grammes with the 40 cc every three hours.

The patient was discharged from the hospital in stable condition, without nausea, and with enough of nutrients. The patient came back one month later for a check-up with weight changes to 3.430 grammes. Two months later, the patient showed good improvement by weighting 4.490 grammes. The last follow-up for the patient was an evaluation of their weight and developmental milestones at 3 months of age, which showed good outcomes **[Table 1 & 2]**.

Table 1. Evaluation of patient weight

Age	Current Weight (grams)	Post op Weight (grams)
3 days	2890	2600
14 days	2810	
1 month	3430	
2 months	4490	
3 months	6100	

Discussion

The case report shows a good intervention for a 3-day old infant diagnosed with Type I duodenal atresia, a congenital intestinal obstruction that can lead to significant morbidity if nor addressed promptly. Early diagnosis of that disorder, which is defined by the duodenum failing to recanalize during fetal development is vital to guarantee appropriate surgical intervention. The infant showed classic signs of duodenal atresia, including bilious vomiting and absence of stool since birth. Confirming the diagnosis was much aided by the "double bubble" sign seen on x-ray.[1]

Early prenatal ultrasound diagnosis can help to enable timely intervention since it improves management of possible complication resulting from delayed treatment. Restoring intestinal continuity has been demonstrated with surgical repair using the Kimura technique, which makes an anastomosis diamond-shaped. This approach reduces complications and advances improved postoperative results. The infant was managed with OGT aspiration every three hours. She kept NPO until no more aspirate was seen.

Table 2. Growth and Development Activities from Neonate to 2 Months

Age	Develompental Milestone Finding in Patient	Developmental Milestone (Standford Medicine)
0-2 months	- Lift head/chest when prone - Eyes track past the midline - Alert to sound - Social (reciprocal) smile - Recognize parent	- Lift head/chest when prone - Eyes track pas the midline - Alert to sound - Social (reciprocal) smile - Recognize Parent
4 months		- Rolls front to back - Grasps a rattle - Laughs & Soothed by parent's voice - Orients head to direct of a voice
6 months		- Sits with little or no support - Reaches with one hand & transfers objects - Babbles & Developing stranger anxiety - Feeds self
9 months		- Pulls to stand - Developing immature pincer grasp & bangs two objects together - Says "mama/dada" indiscriminately & waves bye-bye - Plays gesture games
12 months		- Stands/walks alone - Fine pincer grasp - One word other than "mama/dada" & follows one-step commands with a gesture - Points to desire object
15 months		- Stoops & recovers - Scribbles in imitation - Uses 3-5 words - Uses spoon and cup & turns pages in a book
18 months		- Runs well - Builds a tower of 3 cubes - Points to 1-3 body parts - "Helps" in the house
24 months		- Throws ball overhand & kicks a ball - Copies drawing a line with crayon - Speaks in 2-word combinations & ≥50-word vocabulary & parallel play - Removes an article of clothing
36 months		- Pedals a tricycle - Copies a circle - Speaks in 3-word sentences & 75% of language is intelligible to a stranger - Bruses teeth with help
48 months		- Hops - Copies a square or cross - 100% of language is intelligible to a stranger - Plays cooperatively with a group - Knows 4 colors
60 months		- Skips - Copies a triangle - Defines simple words & uses 5-word sentences - Dresses self

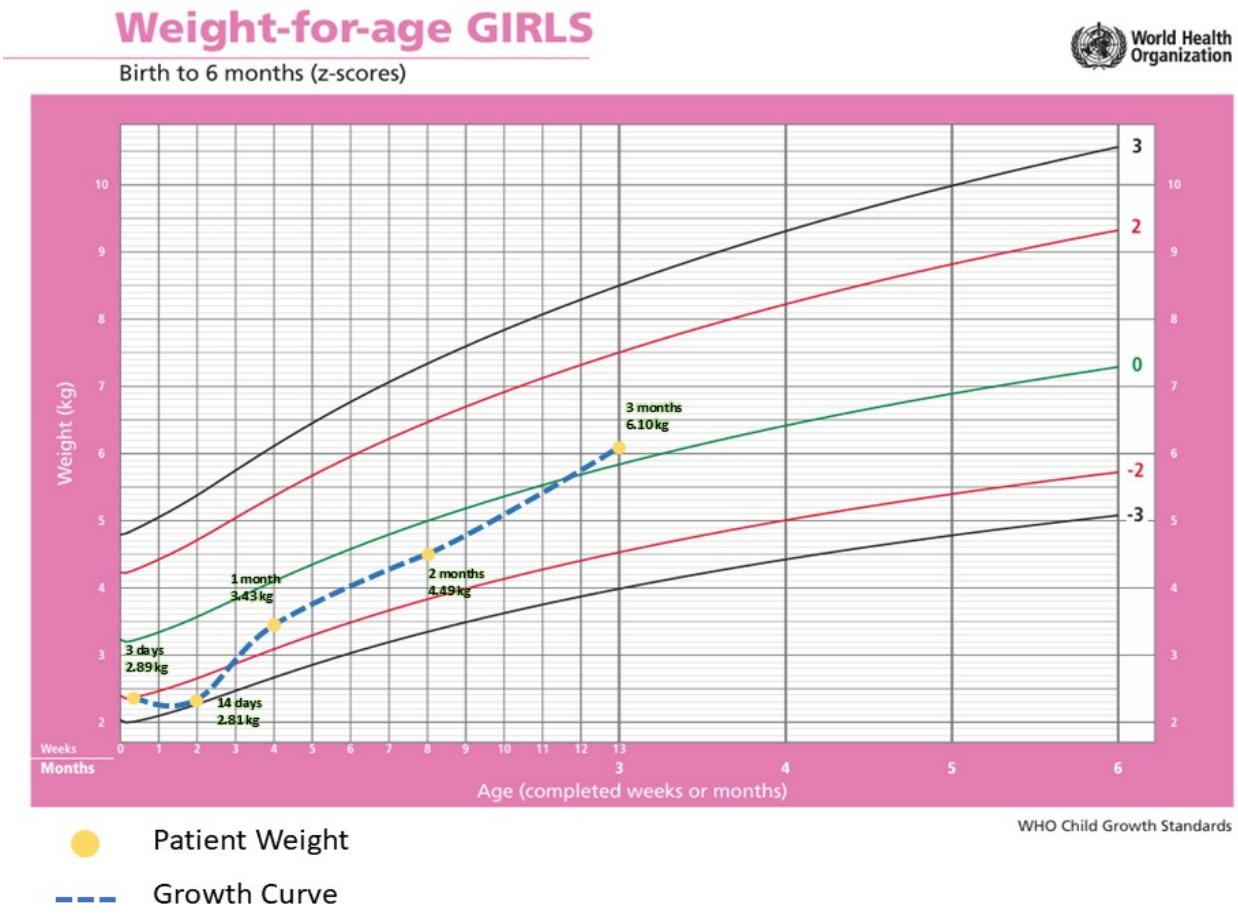

Figure 5. Child growth of patient according WHO

Starting with 10cc every three hours and working up to 40cc, the infant's tolerance to feeds was clearly shown by their slow introduction. Promoting recovery along with preventing complications including aspiration or intestinal obstruction depend on this careful nutritional management.[1]

One month and two months following surgery showed ongoing weight and general health improvement in follow-up assessments. Three months later, the weight came to be 6.1000 grammes. This emphasizes for infants with duodenal atresia the demand of early intervention and through postoperative management. Optimizing long-term health depends on continuous monitoring and multidisciplinary treatment since this disorder is sometimes linked with other congenital anomalies.[1]

Conclusion

Emphasising the importance of early diagnosis and quick surgical intervention, this case report shows the effective management of a 3-day-old infant diagnosed with Type I duodenal atresia. The Kimura technique helped to efficiently restore intestinal continuity, therefore providing good postoperative results which are weight and development milestone of patient. This case shows that the infants with congenital intestinal obstruction such as duodenal atresia can achieve good growth and development with fast intervention and suitable follow-up, so enhancing their long-term health outcomes. Improved management of such disorders in newborns depends on continuous education and research.

Ethics approval

The Ethical approval is not required.

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization, or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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