

# Modified circumumbilical approach for duodenal atresia repair : a scarless surgery

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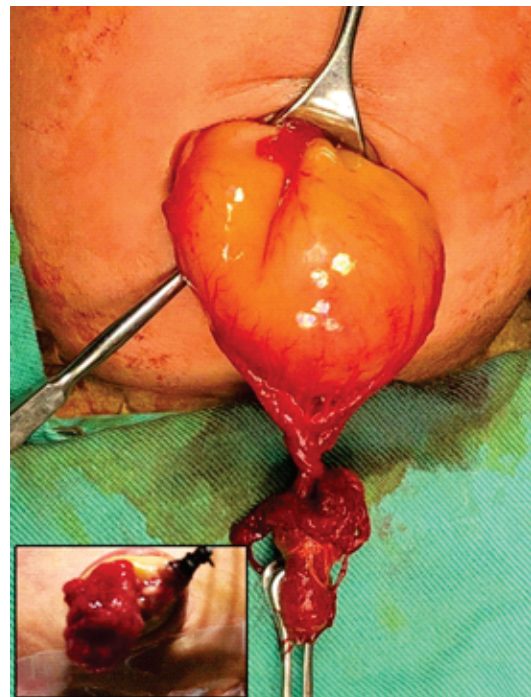
### Introduction

Duodenal atresia is a common congenital anomaly which require surgery during neonatal period to reestablish the intestinal continuity. Transverse upper abdominal incision and use of laparoscopy have been widely described for duodenal atresia repair. In this report, we describe an alternative approach for duodenal atresia repair via a modified circumumbilical incision. This approach has been reported to be comparable with transverse incision for a neonatal laparotomy including for duodenal atresia surgery.

### Case report

The boy was born via elective lower section caesarean section (ELLSCS) at 32 weeks with birth weight of 1.5kg for fetal compromise due to abnormal Doppler signals (absent end diastolic flow). Antenatal scans at 24 weeks found a “double bubble” sign. Baby was born vigorous with good Apgar score. Abdominal radiograph confirmed the presence of double bubble sign suggestive of duodenal atresia. He was kept nil by mouth and had umbilical venous catheter (UVC) insertion on the first day of life for a total parenteral nutrition. At day 2 of life, he had a fleshy lump at the base of umbilical stump with some yellowish stained and presumed to be a persistent vitello-intestinal duct. He was transferred to our center and ultrasound abdomen showed an umbilical hernia with bowel content. The umbilical lump appeared swollen and congested on the next day. With a suspicion of incarceration of umbilical hernia, he was brought to theater for umbilical exploration. A circumumbilical incision was performed and noted to have a herniated omentum through a 1cm umbilical defect (Figure 1). A midline extension over the linea alba was made for a full exploratory laparotomy. Omentectomy was performed, followed by kocherization of duodenum and subsequently underwent duodenojejunostomy with transanastomotic (TA) tube insertion. Postoperatively, the recovery was uneventful. Feeding was started through TA tube and progressed to full

feed within a week. At 2 weeks post-surgery, the wound well healed and abdomen appeared scarless except for the gastrostomy site for TA tube (Figure 2) and he was sent home well.



**Figure 1.** The circumumbilical incision allows exteriorization of stomach and omentum. The herniated omentum was clamped with Babcock clamp, comparable to its appearance before surgery (as shown in the small box)


### Discussion

Gastrointestinal anomalies of the bowel can impact various parts of digestive system. Duodenal atresia is a congenital defect characterized by a abnormal narrow either partial or complete obstruction of the duodenum. This condition occurs in 1 in 10000 live births, affecting boy more frequently.[1] Surgery is the definite treatment aimed at to restoring the normal flow continuity to enable feeding.

Historically, pediatric surgeons have been using the large transverse incision to access the abdomen for duodenal

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atresia repair resulting a big scar that grows which may become cosmetically unattractive. A laparoscopic technique also makes it a possible option for surgical intervention via a smaller incision, but the approach is often associated with an longer operative time, more expensive cost, and a significant steep learning curve.[2] A circumumbilical incision is another attractive option for neonatal laparotomy. It was first reported by Tan and Bianchi in 1986 for pyloromyotomy.[3] This is a common technique among the pediatric fraternity for certain intrabdominal diseases and was found to be feasible, safe, inexpensive, and virtually scarless.[4] Soutter and Askew were the first to report the technique of circumumbilical incision to perform various neonatal surgery including duodenal atresia and stenosis in 2003.[4]

Duodenal atresia repair have 3 surgical anastomosis variants including: duodeno-jejunosomy(DJ) (1916), gastro-jejunosomy(GJ) (1924), and duodeno-duodenostomy(DD) (1943).[5] DJ was the first type of repair performed and considered the procedure of choice for many years.[5] GJ repair technique was not preferred because of the risk of ulceration and malignant transformation due to bilious and pancreatic reflux. DD with a diamond-shaped configuration was described by Kimura et al, which allowed a wider anastomosis for earlier transit of intestinal contents.[5] Most pediatric surgeons prefer DD, because it is more physiological than DJ. However, surgeons may still perform DJ if the anatomy variant, the birth weight and age of the patient did not suit for DD like in case of preterm birth as in

our case. Up till today there is no literature to suggest that one technique is more superior to the other.[6]

Our patient, was known to have duodenal atresia, had abnormal umbilical lesion suspicious of umbilical hernia. Presumably a perforated congenital hernia of umbilical cord, we decided to explore through the umbilicus. Circumumbilical incision is not a routine practice in our center, however the incision was made for the umbilical lesion as it allows to explore the content and with the intention to perform repair and DJ in this patient. Indeed, this approach found to be attractive as it allows surgery to be done comparable to traditional upper transverse abdominal incision with much smaller wound and thus minimal scar formation. However long-term outcome is yet to be uncertain.

This approach is well-suited for operating on the infant's abdomen due to its natural anatomical characteristics. The abdomen of an infant has a limited lengthwise dimension, a relatively thin and flexible abdominal wall, and a comparatively large umbilicus. By manipulating the flexible abdominal wall of the infant, the surgical incision can be positioned precisely over the desired area, without the need to extend it extensively to access distant parts of the abdomen. The elasticity of the skin allows for pulling out the entire bowel, freeing the ascending colon from the retroperitoneum, mobilizing the duodenum, and performing a anastomosis within the surgical field. However, it's important to note that compared to the transverse abdominal or laparoscopic approach, this method has limitations in terms of exploration capability. Additionally, the small opening may pose challenges in accessing organs or masses located outside the peritoneal cavity. Therefore, this approach is recommended only when there is a clear preoperative diagnosis.



Figure 2: 2 weeks post-surgery, the abdomen appeared scarless except for small scar TA tube wound (as shown with arrow)

## Conclusion

The modified circumumbilical approach is an attractive alternative to transverse incision and minimally invasive surgery for a duodenal atresia repair. Apart from cosmetically superior to open operation or even laparoscopy, this approach is safe, feasible and does not require extra equipment or significant learning curve.

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### Learning Points:

- Approach option in approach to duodenal atresia repair can range from small circumumbilical to laparoscopic depending on patients size and birthweight
- Circumbilical is an attractive option, but any surgery is always about exposure and control