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Case Report

Anaesthesia Section

Perioperative Anaesthetic Strategy for Neonatal Foetus-in-Foetu Excision: A Case Report

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ABSTRACT

Foetus-In-Foetu (FIF) is a congenital anomaly that involves the presence of a deformed parasitic twin within its host, most commonly presenting as a retroperitoneal mass at birth. Present case is of a 1.5-month-old female who was referred for elective excision of a gigantic abdominal mass diagnosed antenatally on an anomaly scan in the third trimester. Postnatal imaging showed an enormous retroperitoneal solid-cystic mass with displacement of the surrounding organs, Magnetic Resonance Imaging (MRI) showed consistent findings of a benign mature cystic teratoma. The clinical presentation was in the form of repeated vomiting with feeds, without systemic compromise. Induction of anaesthesia was done by balanced technique, utilising intravenous propofol, fentanyl and atracurium, followed by pressure-controlled ventilation and sevoflurane with oxygen-air for maintenance. Following induction, a single-shot caudal block using 0.2% ropivacaine (0.5 mL/kg) was given under strict asepsis with a 25G short-bevel styletted needle. It gave adequate analgesia for 6-8 hours without any complications. Surgical resection was by removal of the mass and right kidney with minimal blood loss and no transfusion or inotropic support. The postoperative course was uneventful and histopathological study revealed an immature teratoma with features of FIF type containing vertebral and limb elements. The current case emphasises the need for tailored anaesthetic approaches to neonatal FIF, with special reference to the usefulness of caudal analgesia in effective pain relief and opioid-sparing regimen. It also emphasises the imaging diagnostic significance, surgical removal as a gold standard for therapy and follow-up over a long period due to the risk of malignant transformation.

Keywords: General anaesthesia, Infant, Newborn, Pain management, Postoperative care

CASE REPORT

A 1.5-month-old female weighing 4.5 kg was referred for removal of a large retroperitoneal mass. A 28-week gestation foetal anomaly scan identified a complex cystic lesion in the right renal region with polyhydramnios. The infant was delivered at term with no perinatal complications other than neonatal jaundice, managed by a four-day NICU admission and phototherapy. Postnatally, newborn ultrasound revealed a well-demarcated multicystic mass within the right lumbar region, initially suggested as neuroblastoma or adrenal haemorrhage.

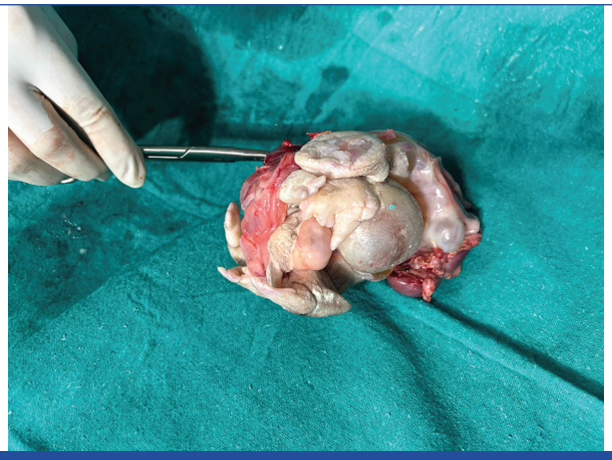
Contrast-enhanced MRI revealed a 10×8.8×9.8 cm retroperitoneal mass extending from the right hypochondrium to the iliac fossa, composed of solid and cystic components. The solid component measured 3.6×4.3×5.5 cm; T1- and T2-weighted signals were isointense, with restricted diffusion and mild enhancement after contrast. Cystic regions were T2 hyperintense with fat, calcifications and hair-like strands; the right adrenal gland was not distinctly visualised. The lesion displaced the liver, rotated the right renal hilum, shifted the right kidney inferomedially and abutted large vessels and bowel without invasion. These radiographic features suggested a benign mature cystic teratoma.

Clinically, the child had persistent non bilious vomiting for eight days with milk intake, without fever, bowel or bladder alterations, or neurologic symptoms. Physical examination yielded stable vitals and a normal systemic examination. Laboratory results were haemoglobin 10.5 g/dL, White Blood Cells (WBC) 7,300/mm^3, platelet count 3.83 lac/mm^3, and normal liver and renal function. The patient was referred after a paediatric surgical review for elective excision under General Anaesthesia (GA) with caudal analgesia.

Anaesthetic planning and intraoperative course: With the large abdominal mass and risk of compression of intra-abdominal organs and haemodynamic instability, the anaesthetic management was preplanned for controlled induction, haemodynamic stability, and effective pain relief. A 24-G IV cannula was placed and maintenance fluid (Isolyte P) was started at 4 mL/kg/hour. Standard American Society of Anaesthesiologists (ASA) monitoring was used. Premedication included glycopyrrolate 4 µg/kg (0.018 mg), midazolam 0.05 mg/kg (0.225 mg) and fentanyl 2 µg/kg (9 µg). Induction was with propofol 2 mg/kg (9 mg) and atracurium 0.5 mg/kg (2.25 mg) was given for muscle relaxation. Following confirmation of mask ventilation, the patient was intubated using a 3.0 mm uncuffed tube and confirmed by capnography and bilateral auscultation. Pressure-controlled mechanical ventilation was initiated. Anaesthesia maintenance was performed with sevoflurane 1 MAC in a 50:50 oxygen-air mix, with intermittent boluses of atracurium (0.1 mg/kg every 25-30 minutes).

Following this, the infant was positioned in the left lateral decubitus. A 25-gauge short-beveled, styleted caudal needle was inserted through the sacral hiatus, and a clear "pop" was felt on crossing the sacrococcygeal ligament. Negative aspiration for Cerebrospinal Fluid (CSF) and blood was confirmed. To rule out intravascular dissemination, a test dose of 0.1 mL was administered, followed by incremental delivery of 0.5 mL/kg (2.25 mL) of 0.2% ropivacaine over 30 seconds, with continuous heart-rate and limb-tone monitoring. A distinct "swoosh" sound over the thoracolumbar area guaranteed proper caudal spread. The block provided adequate analgesia without complications. Surgery was performed using a right upper quadrant transverse incision. The mass was adherent to the right kidney, which was excised en bloc after ligation of the renal vessels and ureter. Intraoperative images of the retroperitoneal mass and specimen images showing appendages and vertebral columns are seen in [Table/Fig-1,2]. Approximately 60 mL of straw-colored fluid was aspirated and sent for cytology. Total blood loss was approximately 20 mL; no inotropes or transfusions were administered. The surgery lasted 105 minutes, and intraoperative vital signs were within normal limits, as seen in [Table/Fig-3]. Following normal

[Table/Fig-1]: Intraoperative image of the retroperitoneal mass.



[Table/Fig-2]: Specimen image showing appendages and vertebral columns.

Time interval	Heart rate (beats/min)	Systolic BP (mmHg)	Diastolic BP (mmHg)	SpO_2 (%)
Baseline	142	72	46	100
30 minutes	138	70	44	100
60 minutes	136	68	42	100
90 minutes	140	72	46	100
105 minutes	144	74	48	100

[Table/Fig-3]: Intraoperative haemodynamic parameters.

arterial blood gas analysis, neuromuscular blockade was reversed with neostigmine 0.05 mg/kg (0.225 mg) and glycopyrrolate 0.01 mg/kg (0.045 mg) and the infant was extubated. She was taken to the paediatric intensive care unit and cared for postoperatively with intravenous fluids, cefotaxime 50 mg/kg every 8 hours, pantoprazole 1 mg/kg every 24 hours, ondansetron 0.1 mg/kg every 8 hours and paracetamol 15 mg/kg every 6 hours. The caudal block provided adequate analgesia for 6-8 hours without further opioid requirements. The patient was scheduled for long-term follow-up to monitor for recurrence or potential malignant transformation. At six months postoperatively, clinical evaluation and imaging showed no evidence of recurrence, and the child demonstrated normal growth and development without complications.

DISCUSSION

The FIF is an extremely rare congenital anomaly caused by abnormal embryogenesis in monozygotic, monochorionic diamniotic twinning, in which one deformed parasitic twin is housed within its host. While FIF is most frequently encountered as an infantile abdominal mass, its rarity poses diagnostic and perioperative challenges. It is essential to rule out teratoma, which carries a malignancy risk, and this is primarily determined by imaging and histopathology. The presence of a vertebral axis, limb buds and other well-structured organ architectures favours FIF. FIF must be distinguished from teratomas because of their different prognostic implications. Histopathologically, FIF is defined by the existence of well-developed organ structures, such as elements of the axial skeleton and limb buds, typically with a metameric arrangement reminiscent of a rudimentary foetus. In contrast, teratomas, especially fetiform teratomas, can have organised tissue resembling foetal organs but lack a definitive axial skeleton and metameric pattern like FIF. The presence of a vertebral column and organised organ structures within FIF supports its interpretation as a reabsorbed twin rather than a teratoma. This integration gives rise to a parasitic, usually deformed foetus housed inside its host, indicating incomplete embryonic separation and aberrant twinning mechanisms [1-3]. The most common site of FIF is the retroperitoneum, where it may exert mass effect on vital structures, manifesting as vomiting, feed intolerance, jaundice, or abdominal distension. In the current case, antenatal ultrasonography was suspicious, further defined by MRI postnatally and diagnosed by surgical resection and histopathology. The parasitic foetus within a retroperitoneal mass indicates the entity's complexity and range [4,5]. Perioperative care of FIF, especially in infants and neonates, is optimised with individualised and coordinated planning. FIF typically presents as enormous masses hanging from or compressing vital organs and vessels, with possible fluid shifts, haemorrhage and haemodynamic changes. Induction of anaesthesia and extubation should be guarded against sudden circulatory changes [6].

[Table/Fig-4] demonstrates how anaesthetic techniques and monitoring vary with patient profile and anticipated intraoperative challenges [6-8]. Khatavkar SS et al., described invasive intraoperative monitoring with GA and epidural analgesia in a similar procedure [6], whereas in present case invasive arterial or central access was not required. Instead, a conservative but effective approach using GA with sevoflurane, atracurium and a single-shot caudal block achieved opioid-sparing analgesia for 6-8 hours, early extubation and smooth recovery. The effective use of caudal analgesia reinforces its value in paediatric anaesthesia for lower abdominal surgeries [9,10].

Histopathology confirming vertebral and limb structures, typical of FIF, highlights the importance of clear surgical resection to exclude immature teratoma. Postoperative follow-up and tumour-marker surveillance remain essential to detect recurrence or malignant transformation [4].

Alternative management approaches for FIF focus on individualised surgical planning and perioperative risk minimisation over nonoperative cure: total surgical resection is the gold standard to alleviate mass effect and establish diagnosis, but the technique may be open or minimally invasive (laparoscopic or robot-assisted) in selected, accessible cases to minimise trauma and recovery time. For massive or highly vascular retroperitoneal tumours, staged approaches with preoperative vascular mapping and selective transcatheter embolisation to minimise intraoperative blood loss can be entertained on a case-by-case basis. Where imaging or serum markers (particularly markedly elevated alpha-fetoprotein) suggest an immature or malignant teratoma instead of benign FIF, an oncologic algorithm involving multidisciplinary consultation, perioperative oncologic planning and adjuvant chemotherapy (instead of mere excision alone) should be entertained. Prenatally, diagnosis permits planning of delivery (timing, neonatal care, urgent

Author/Year	Patient age and presentation	Site of FIF	Anaesthetic technique and monitoring	Perioperative considerations	Postoperative outcome
Sivachandran L et al., [7]	Infant with abdominal mass, mass effect symptoms	Retroperitoneum	General Anaesthesia (GA) with cautious induction, invasive monitoring	Gentle optimisation, diligent intraoperative monitoring to avoid sudden circulatory changes	Uneventful recovery
Khatavkar SS et al., [6]	Child with large retroperitoneal mass	Retroperitoneum	General anaesthetic with epidural analgesia, internal jugular central line, radial arterial line	Beat-to-beat Blood Pressure (BP) monitoring, invasive access for fluid and haemodynamic management	Stable postoperative course
Gosavi K et al., [8]	Neonate (one-day-old) with malformed foetus externally attached to face	Craniopagus position (external attachment)	Intravenous induction with ketamine maintaining spontaneous breathing, Laryngeal Mask Airway (LMA) insertion, check laryngoscopy, tracheal intubation	Difficult airway management due to mass obstructing mouth, LMA as bridge, emergency tracheostomy prep, close airway assessment	Uneventful surgery and recovery; discharged on 7th day
Current case	1.5-month-old female, antenatal detection, postnatal MRI-defined mass	Retroperitoneum	General anaesthesia (GA) with sevoflurane, atracurium, one-shot caudal epidural block	Judicious fluid resuscitation, cautious anaesthetic titration, opioid-sparing extended postoperative analgesia	Early extubation, 6-8 hour pain relief, uneventful recovery

[Table/Fig-4]: Anaesthetic techniques and monitoring in similar cases [6-8].

imaging) and organised multidisciplinary management (neonatology, paediatric surgery, interventional radiology, paediatric anaesthesia) to maximise timing and technique of intervention; stringent postoperative monitoring with clinical assessment, imaging, and tumour-marker analysis is necessary to diagnose recurrence or malignant change [3,6].

CONCLUSION(S)

The FIF is a rare congenital anomaly requiring a high index of suspicion and careful differentiation from teratomas due to differing prognostic significance. The case again highlights the importance of thorough prenatal and postnatal scanning, early surgery and cautious perioperative planning. The use of a postinduction caudal block contributed to excellent intraoperative and postoperative analgesia, reduced opioid use and early recovery and extubation. With proper anaesthesia and surgical care, outcomes in neonates undergoing FIF excision can be excellent. Follow-up should be long-term to observe for any potential malignant transformation or recurrence. This case adds to the sparse but growing literature on anaesthetic care of FIF and highlights the effective role of regional anaesthesia methods in paediatric abdominal surgery.

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