



# Paediatric Regional Anaesthesia for a Tibial Biopsy in a Child with Anterior Mediastinal Mass

## Running Title: Case report of anaesthetic management of a child with anterior mediastinal mass for tibial biopsy

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### ABSTRACT

We present the successful management of a 7-year-old male child weighing 17.5 kg who presented with an anterior mediastinal mass and was scheduled for a tibial biopsy under anaesthesia. Child had complaints of fever, cough, dyspnoea and right leg swelling and pain. Upon thorough evaluation, an MRI of the right knee revealed a tibial mass measuring 38 x 29 mm, suspected to be of neoplastic origin. The child required 8L of oxygen via a face mask to maintain a saturation level of 98%, while saturation dropped to 88% on room air. The child was premedicated and sedation was achieved with Inj. Ketamine 10mg. Face mask was held using sevoflurane (2-4%), while ensuring the maintenance of spontaneous ventilation. Under strict aseptic measures, and a lumbar puncture was performed with a 23G needle at the L4-L5 level, following local anaesthetic infiltration. Subsequently, 1.2 ml of 0.5% hyperbaric bupivacaine and Inj. Fentanyl 10 mcg were injected after confirming clear cerebrospinal fluid backflow. Following spinal anaesthesia, the child was placed on an oxygen face mask and tibial lesion biopsy and bone marrow aspiration were successfully completed. The child remained hemodynamically stable with spontaneous respiration throughout the 45-minute procedure. Regional anaesthesia for paediatric patients requires the efforts of an interprofessional healthcare team that includes the clinician, anaesthesiologists, and OR nursing staff, coordinating their activities, and monitoring patient response to achieve optimal outcomes with minimal adverse events.

**Keywords-** paediatric, mediastinal mass, paediatric spinal anaesthesia

### I. INTRODUCTION:

Anterior mediastinal masses present significant challenges to anaesthesiologists due to

their potential to induce cardiorespiratory complications. The maintenance of a patent airway relies on the respiratory muscle tone, but this function becomes compromised under anaesthesia. Children face an elevated risk owing to the more pliable nature of their airways and surrounding structures. <sup>(1)</sup> If one talks about paediatric spinal anaesthesia, it comes with its own limitations. There is still a lot of hesitation in the routine use of this technique probably due to lack of awareness, limited availability of paediatric spinal needles, or fear of adverse consequences. <sup>(2)</sup>

### II. CASE REPORT:

We present the successful management of a 7-year-old male child weighing 17.5 kg who presented with an anterior mediastinal mass and was scheduled for a tibial biopsy under anaesthesia. The child's clinical history included a 20-day period of right leg pain and swelling, accompanied by difficulty in walking. Additionally, the child exhibited symptoms of fever and cough for ten days, which led to rapid and laboured breathing. Upon thorough evaluation, an MRI of the right knee revealed a tibial mass measuring 38 x 29 mm, suspected to be of neoplastic origin. Subsequently, the child was referred to our medical centre for further assessment and treatment.

History revealed non-consanguineous parental lineage and a full-term normal vaginal delivery with a birth weight of 2.5 kg. No significant prenatal, perinatal, or postnatal events were reported. During the general physical examination, no abnormalities were observed except for tachypnoea, with a respiratory rate of 30/min. The child required 8L of oxygen via a face mask to maintain a saturation level of 98%, while saturation dropped to 88% on room air. Comfort was only achieved when the child was positioned with head elevated and in a right lateral position.



A detailed examination of the respiratory system suggested of reduced chest wall movements and restricted chest expansion on the right side. On auscultation there was decreased air entry on the right side and bronchial breath sounds on the left. No other significant findings emerged from the examination of other systems.

Blood tests revealed a haemoglobin level of 10.2 g/dl and a white blood cell count of 16200. Chest X-ray results displayed complete collapse of the right lung. A chest CT scan confirmed the presence of a soft tissue mass in the anterior and middle mediastinum, causing compression of the right main bronchus and complete collapse of the right lung, along with moderate right pleural effusion.

Due to the unsuccessful attempt by paediatric orthopaedic surgeons to perform a bedside bone marrow biopsy, the child was scheduled for a repeat procedure under anaesthesia. Primary anaesthetic concerns in this case included fever spikes, tachypnoea, respiratory distress, wheezing on auscultation, and the necessity for oxygen support. Given the collapsed right lung and lower respiratory tract infection, the child was planned for a neuraxial subarachnoid block.

Informed consent was obtained from the parents after a thorough explanation of the high-risk nature of the procedure, which might require post-procedure mechanical ventilation and an extended stay in the intensive care unit. The operating room was fully equipped with all necessary anaesthesia and resuscitation equipment. Upon entering the operating room, standard ASA monitors were attached, and a 22G IV cannula was in place. Baseline vital signs were recorded as follows: heart rate - 121 beats per minute, blood pressure - 103/60 mmHg, respiratory rate - 35 cycles per minute, and  $spO_2$  - 88% on room air, which improved to 98% with 10L oxygen via a face mask. The child was positioned in his comfortable position that was right lateral position with the head elevated. Paediatric surgeons were on standby for rigid bronchoscopy if needed.

The child was premedicated with Inj. Glycopyrrolate 10 mcg/kg, Inj. Midazolam 0.03 mg/kg, and Inj. Ondansetron 0.1 mg/kg. Steroids, including Inj. Dexamethasone 0.1 mg/kg and Inj. Hydrocortisone 2 mg/kg, were administered. Sedation was achieved with Inj. Ketamine 10mg. Face mask was held using sevoflurane (2-4%), while ensuring the maintenance of spontaneous ventilation. Under strict aseptic measures, the surgical site was prepared, and a lumbar puncture was performed with a 23G needle at the L4-L5 level, following local anaesthetic infiltration.

Subsequently, 1.2 ml of 0.5% hyperbaric bupivacaine and Inj. Fentanyl 10 mcg were injected after confirming clear cerebrospinal fluid backflow.

Following the spinal anaesthesia, the child was placed on an oxygen face mask and prepared for surgery. The tibial lesion biopsy and bone marrow aspiration were successfully completed, and samples sent for analysis. The child remained hemodynamically stable with spontaneous respiration throughout the 45-minute procedure. Post the procedure, child was shifted to paediatric surgery ward. In the post operative period, vitals were stable, oxygen face mask was connected and started tolerating orally feeds.

The bone marrow biopsy revealed Anaplastic large B cell Lymphoma, a type of Non-Hodgkin's Lymphoma, which was further confirmed by a PET CT scan, identifying the mediastinal mass as the primary lesion. The child subsequently received chemotherapy with steroids, Vincristine, and Doxorubicin.

### III. DISCUSSION:

In the event of regional technique failure, we had alternative strategies in place. Plan B included mask holding with sevoflurane, maintaining spontaneous ventilation, and administering graded doses of Inj. Ketamine. Plan C involved the administration of general anaesthesia with the option for rigid bronchoscopy with paediatric surgeons on standby. The key factors for airway management of paediatric case with mediastinal mass include considering awake fibre-optic bronchoscopy, the maintenance of spontaneous ventilation, avoidance of muscle relaxants, immediate availability of rigid bronchoscopy, and elective cardiopulmonary bypass. For patients with high-risk features, multidisciplinary input should be sought to decide whether the child would be fit for a procedure under GA/sedation or considered unfit for any procedure.<sup>(3)</sup>

Regional anaesthesia for paediatric patients requires the efforts of an interprofessional healthcare team that includes the clinician, anaesthesiologists, and OR nursing staff, coordinating their activities, and monitoring patient response to achieve optimal outcomes with minimal adverse events.<sup>(4)</sup> Thorough preoperative assessment, close collaboration with surgical teams, meticulous planning, and preparations for potential perioperative complications are integral to the successful management of challenging cases like this one.



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3. Preoperative CT Chest of the patient



**FIGURES:**

1. Preoperative chest xray of the patient



2. Preoperative Xray of right knee joint

