



## Chest wall mesenchymal hamartoma in an infant: Evaluation with electrical impedance tomography

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Keywords:	Congenital Malformations, Critical Care, Imaging, Neonatal Pulmonary Medicine
Other Keywords:	Electrical Impedance Tomography
Abstract:	Mesenchymal hamartoma of the chest wall (MHCW) is a rare benign non-neoplastic lesion of infancy arising from chondro-osseous tissue. Although its natural history suggests spontaneous regression, we describe a fatal case in a neonate with significant respiratory compromise. We explored the use of electrical impedance tomography (EIT) to evaluate the dynamic impact of such space occupying lesions on a ventilated infant.

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## Response to Reviewers

Reviewers' Comments to Authors:

Reviewer: 1

Comments to the Author (Please do not indicate the priority for publication, or any identifying information, here. If attaching a file, please ensure that any information identifying you, your contact information, or institution is blinded.)

Many thanks for making changes to your case report. I suggest a few more, minor changes.

- *Thank you for your suggestions and the changes are outlined below.*

Page 6, line 40: "This is the first reported case of an infant with a severe thoracic anomaly, MHCW, where functional EIT was performed on a mechanically ventilated infant to assess the impact and dynamic respiratory function". Although this is the first case report of EIT being used in MHCW, it is not the first case report of EIT use in severe thoracic abnormalities (<https://casereports.bmj.com/content/2018/bcr-2017-224040.full>). I suggest a rewording and inclusion of this reference.

- *As suggested, the wording has been changed to 'Although this is the first reported case of the use of functional EIT in an infant with MHCW, EIT has been used previously to assess the impact and dynamic respiratory function in a mechanically ventilated infant with a severe thoracic anomaly.<sup>4</sup>' and the reference has been included.*

The figure should be edited. A single image (either a minute ventilation image, or a still of a tidal image) would be of more use than the five wave forms (Views:full screen image on the monitor). Some annotation would enable the reader to understand the orientation of the image.

- *As suggested, the figure has been edited to now include a single tidal image. I have also included the percentages for each region of interest as I think that assists with interpreting the figure. In addition, the figure legend has been altered to help the reader understand the orientation of the image and now reads '(D) EIT tidal image on day 6. Spontaneous tidal ventilation is decreased in the right posterior quadrant. The EIT image is orientated similarly to a CT image with region of interest (ROI) 1 the anterior right quadrant, ROI 2 is the anterior left quadrant, ROI 3 is the posterior right quadrant and ROI, the posterior left quadrant of the lung.'*

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36 **Author Contributions:**

37 Concept and design: LJ, JH

38 Analysis and interpretation: LJ, JH

39 Reviewing and writing the manuscript for important intellectual content: JC, LJ, JH  
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## Abstract

Mesenchymal hamartoma of the chest wall (MHCW) is a rare benign non-neoplastic lesion of infancy arising from chondro-osseous tissue. Although its natural history suggests spontaneous regression, we describe a fatal case in a neonate with significant respiratory compromise. We explored the use of electrical impedance tomography (EIT) to evaluate the dynamic impact of such space occupying lesions on a ventilated infant.

## Case report

A Caucasian baby girl was born to a multiparous mother in a rural health service, 210km from a tertiary neonatal intensive care unit in Queensland, Australia. Antenatal history was unremarkable including morphology scans at 24 weeks gestation. Following suspected rupture of membranes, labour was induced at 39 weeks gestation and the baby girl was born via vaginal delivery with a birth weight of 3825g. Apgar scores were 5 and 6 with respiratory distress present at birth. The baby received support with continuous positive airway pressure, and was commenced on antibiotics and intravenous fluids. There was initial improvement in work of breathing with respiratory support weaned to low flow nasal prong oxygen. Chest x-ray performed at 2 hours of age demonstrated a large heterogeneous opacity occupying the right hemithorax with minimal underlying lung aeration (Figure 1A), associated deformity and splaying of the 3<sup>rd</sup> to 8<sup>th</sup> ribs, and mediastinal shift. On examination, the baby was not dysmorphic with normal chest wall shape and no palpable external masses. The right nipple was inferiorly displaced. Nasal flaring and grunting was evident and the patient had significant oxygen requirement. Auscultation of the chest revealed diminished air entry on the right. Cardiovascular,

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## Results

Both the CT performed on day 2 and MRI performed on day 19 clearly demonstrate a mass in the right lower lobe with significant mediastinal shift (Figure 1B and 1C). The EIT image demonstrates minimal ventilation occurring in the right lower quadrant with 78% (32% + 50%) of ventilation occurring on the left side, and just 15% of ventilation occurring in the right upper quadrant during an inspiration (Figure 1D).

## Discussion

Mesenchymal hamartoma of the chest wall is an extremely rare benign congenital lesion arising from extrapleural ribs with less than 100 cases described in literature.<sup>2</sup> When MHCW develops in the early fetal period, pulmonary hypoplasia and respiratory insufficiency can ensue. Surgery is considered for symptomatic cases, although the procedure itself comes with significant morbidity and debilitation. Contemporary approach therefore advocates conservative management where possible.<sup>3</sup>

Although this is the first reported case of the use of functional EIT in an infant with MHCW, EIT has been used previously to assess the impact and dynamic respiratory function in a mechanically ventilated infant with a severe thoracic anomaly.<sup>4</sup> In this instance, we used EIT to determine if it could reliably identify the lung abnormality which had been detected on CXR and CT. The functional EIT images, showing significantly reduced ventilation in the posterior right lung quadrant, correlated with the conventional CXR, CT and MRI findings which depicted a mass in the right lower lobe. We were able to demonstrate that EIT could be used as an alternative method to assist with identifying the impact and progress of lung pathology, and in the future,

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## 51 **Acknowledgements**

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## 51 **Acknowledgements**

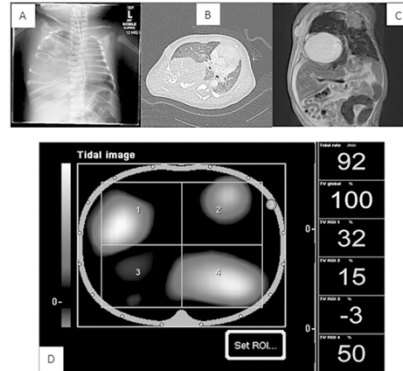
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152x85mm (300 x 300 DPI)