

The use of Proximal Intercostal Nerve Block Catheter for Acute Left Ventricular Assist Device Associated Chest Wall Pain

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Introduction

- The escalating prevalence of advanced heart failure [1] has led to an increased reliance on left ventricular assist devices (LVADs) as both bridge to heart transplant and destination therapy [2,3]. LVAD treatment has been shown to improve survival [4] however, the acute and chronic pain which can result from LVADs has been understudied.
- The most recent LVAD device, the Heartmate3 (Abbott, Plymouth NM), comes in a single size. There are no limitations for smaller patients in terms of candidacy for LVAD as current retrospective data suggest similar functional outcomes, and devices has been placed successfully in patients as small as 22kg [5,6,7].
- Proximal intercostal nerve blocks (PICB) under ultrasound guidance provide targeted analgesia to specific dermatomes along the thoracic wall and provide a safer alternative when anticoagulation could prohibit neuraxial techniques such as epidural or paravertebral analgesia
- Intercostal nerve blocks have been used to manage acute postoperative pain following LVAD placement via thoracotomy [9]. However, to our knowledge, no one has described acute non-incisional chest wall pain associated with LVAD placement. In this case report, we describe the development of acute non-incisional chest wall pain, at the level of the LVAD device, and successful treatment with PICB nerve block catheter.

Material and Methods

As the case report is devoid of patient identifiable information, it is exempt from IRB review requirements as per Brigham and Women's Hospital policy. Patient informed consent was obtained for submission of a case report.

Case Report

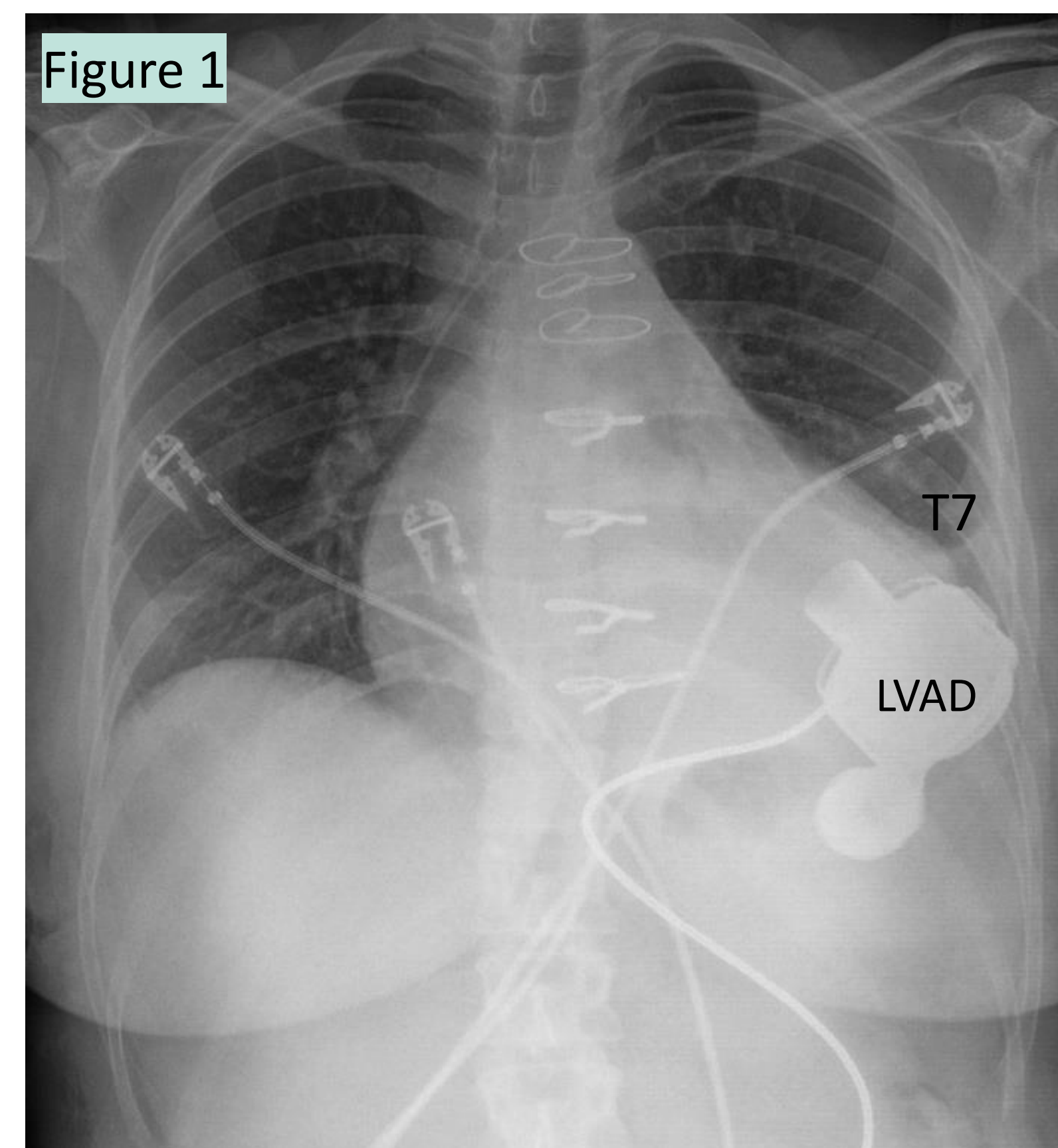


Figure 1

A petite 30 year old female (5'5", BSA 1.73 m2) with a history of familial cardiomyopathy complicated by peripartum non-ischemic cardiomyopathy requiring LVAD placement (Heartmate 3) via a median sternotomy due to worsening symptoms of heart failure. The post-operative pain service was consulted on POD#8 due to persistent poorly controlled pain in a sharp band radiating internally along the torso (correlating with T7 dermatome) isolated on the left side of her chest exacerbated by movement and deep breaths. Figure 1 represents the chest radiograph notable for cardiomegaly and the LVAD in proximity to chest wall.

Figure 1. Chest X-ray showing LVAD within chest and cardiomegaly.

Figures 2 and 3. Proximal intercostal spaces before and after injection showing pleural bowing

A T7-8 PICB was performed with injection of 20 mL of 0.25% ropivacaine followed by a bupivacaine infusion of 0.125% running at 6 mL/hour. Figure 2 and 3 shows the relevant ultrasound anatomy for the PICB. By the next day, the patient's sharp shooting pain had resolved with just minor aching in the area. The nerve block infusion continued over 6 days providing significant pain relief. On POD#15, the bupivacaine infusion was paused for approximately 36 hours with the catheter left in situ, without return of the pain, so the catheter was removed. Cryoablation was considered at this time but given that her sharp chest pain had resolved, it was deferred and the patient was discharged on POD#19. Since discharge, the patient has unfortunately experienced a recurrence of the sharp internal left sided chest pain and is now following with chronic pain for consideration of more long lasting interventions.

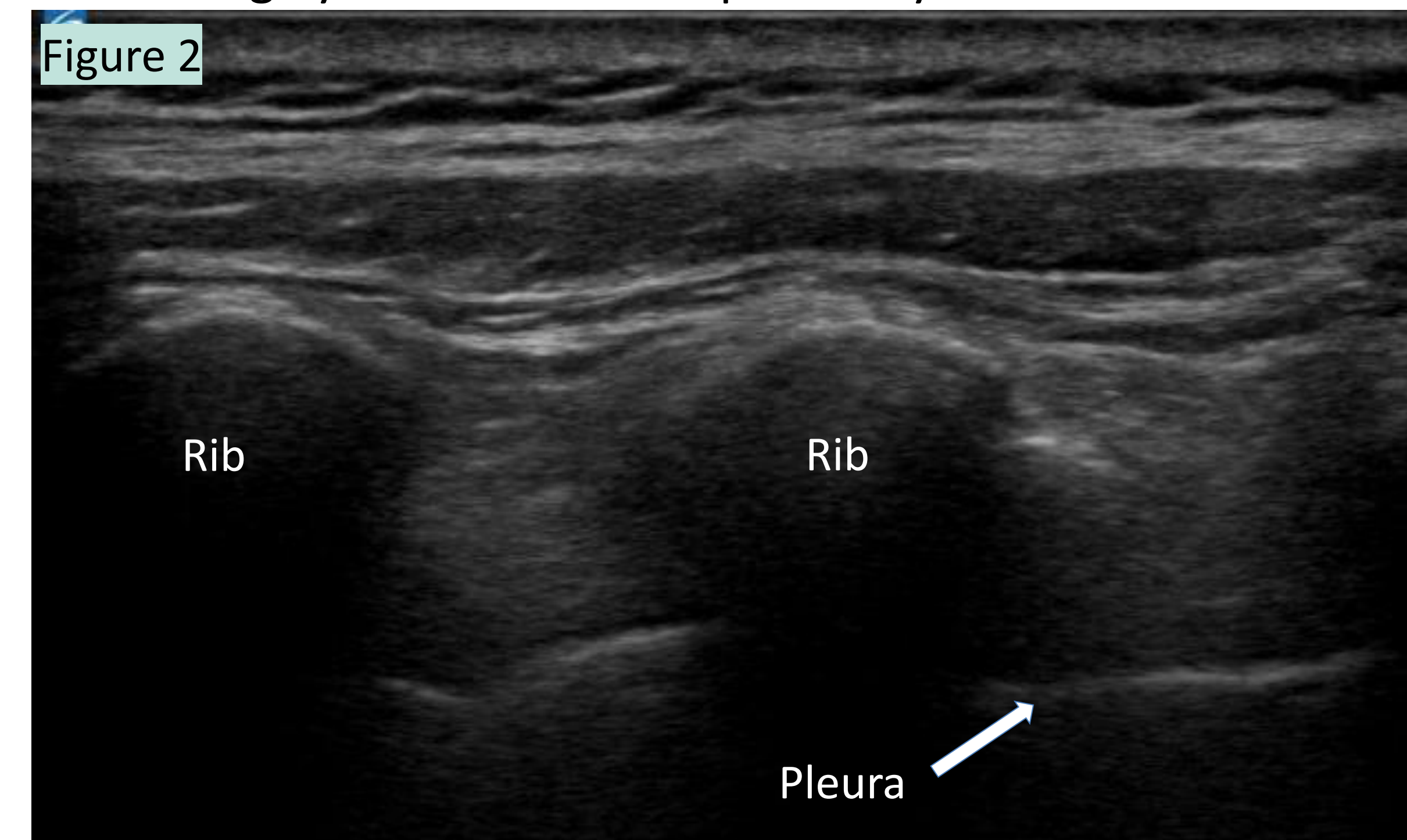


Figure 2

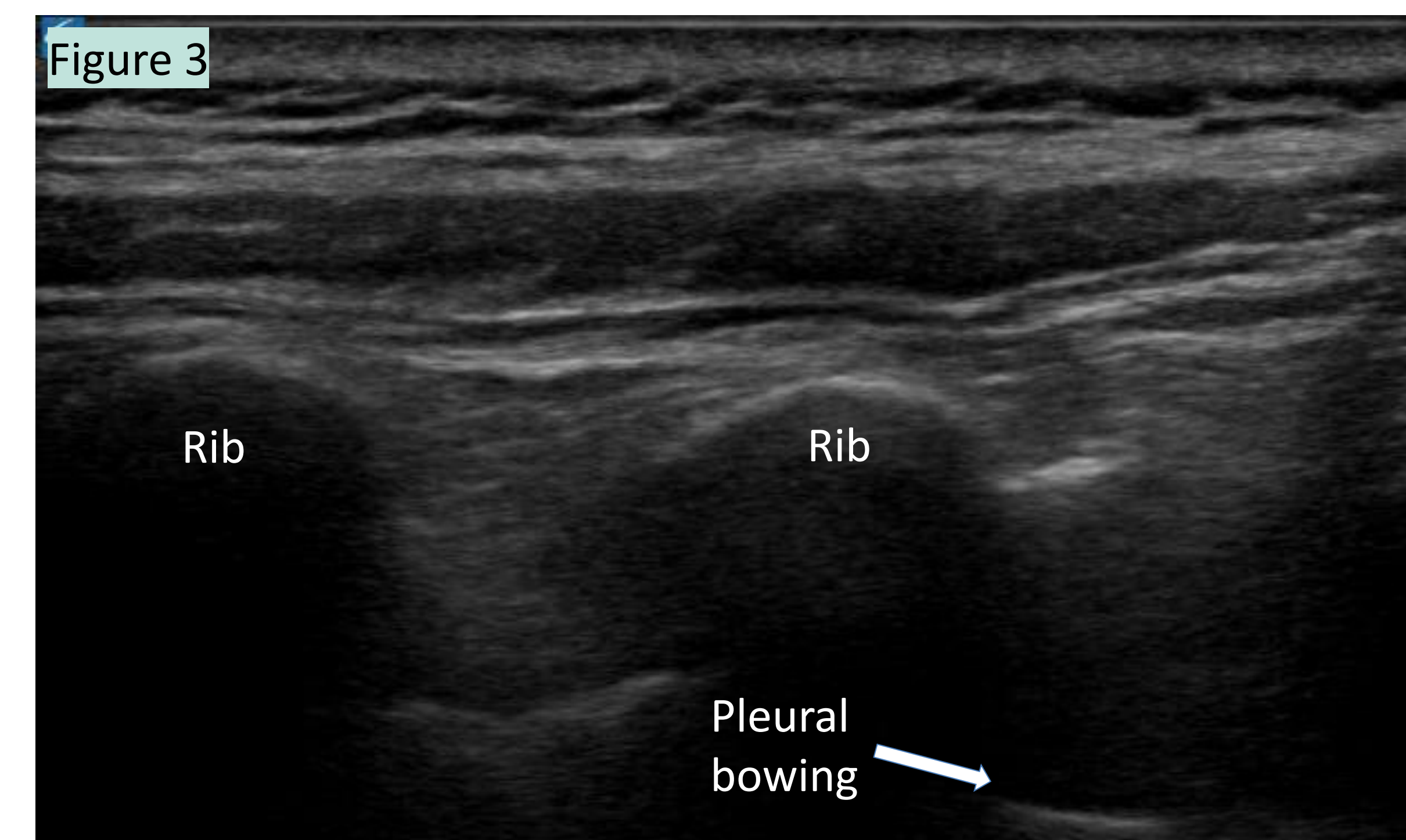


Figure 3

Discussion

- We present a case of successful but temporary relief from non-incisional chest wall pain following LVAD insertion using a PICB catheter. Unlike other reported techniques addressing LVAD-related pain, such as serratus anterior plane block or intercostal nerve block [10], our case is unique as the pain source was within the chest wall rather than associated with a specific incision or the LVAD driveline.
- Chronic pain incidence in LVAD patients is approximately 10% [4], a figure likely to increase with more device placements and longer patient lifespans. While it's unclear if the pain in our case resulted from the device contacting the chest wall, factors such as the patient's petite size and history of dilated cardiomyopathy suggest possible contributors.
- The use of PICB in our case proved effective even with therapeutic anticoagulation. However, the limited duration of nerve block catheters is highlighted, prompting consideration of cryoablation for longer-lasting relief. Nonetheless, the procedural risks in anticoagulated individuals should be carefully evaluated against potential benefits. Further studies are crucial for refining pain management strategies in LVAD patients.

Works Cited

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