INTRODUCTION:
• Thoracic epidural analgesia (TEA) provides dynamic pain relief for thoracic surgical procedures and has been commonly used for pectus excavatum repair 1.
• TEA carries the potential risk of cardiovascular depression and hypotension due to:
  - local anesthetic-induced negative inotropic effects
  - impaired compensatory vasoconstriction
  - inhibition of cardiac sympathetic fibers originating at T1-5 resulting in vagal predominance 2,3

We report a case of P wave inversion in a 15-year-old male undergoing pectus excavatum repair with TEA.

CASE REPORT:
• A 15-year-old male without past medical history of cardiac disease presented for pectus excavatum repair.
• A thoracic epidural catheter was placed at level T7-8 and placement was confirmed by epidurogram with 2ml of Omnipaque (Figure 1).
• The ECG demonstrated normal sinus rhythm in lead II before and immediately after thoracic epidural placement (Figure 2).
• P wave inversion developed immediately after injecting 5 ml of 0.2% ropivacaine (Figure 3), returning to normal after 5 minutes.

Figure 1. Epidurogram demonstrating TEA catheter placement at T7-8

Figure 2. ECG revealing normal sinus rhythm

Figure 3. ECG revealing P wave inversion

• P wave inversion recurred when an additional 5 ml 0.2% ropivacaine was injected epidurally 10 minutes after the initial dose.
• A test dose of 2% lidocaine with epinephrine was administered without any changes in heart rate and blood pressure. Glycopyrrolate was administered, raising the heart rate but with no effect on the P wave.
• P wave inversion was intermittently present throughout the pectus repair, with the patient hemodynamically stable. P wave inversion was absent during the recovery period.
• Postoperative analgesia infusion of 0.1% ropivacaine with 2mcg/ml fentanyl at 7 ml/hr was started epidurally, with substantial pain ensuing the first postoperative night. Additional analgesia of 4.8 mg of intravenous morphine was given and epidural analgesia was changed to 0.2% ropivacaine at 10 ml/hr, with the pain thereon well controlled.
• The epidural was removed on postoperative day four. No EKG abnormality was detected while the patient remained an inpatient.
• Further cardiac evaluation consisting of a 24-hour holter monitor and echocardiogram revealed benign findings, correlating the P wave inversion as a normal variant requiring no further examination.

DISCUSSION:
• P wave abnormalities have been correlated with atrial hypertrophy caused by pressure overload and atrial enlargement, changes resulting from volume overload.
• P wave inversion is often associated with skeletal abnormalities, such as pectus excavatum, due to:
  - changes in intrathoracic pressure
  - sternal compression of the heart
  - cardiac rotation (Figure 4) 4,5
• Compounding changes in preload and inhibition of cardiac sympathetic activity due to TEA can cause P wave inversion.

CONCLUSION:
• Confirmation of appropriate TEA placement by epidurogram can rule out intravascular injection of local anesthetic as a causative factor for acute arrhythmias.
• Vigilant monitoring for acute arrhythmias and correct identification of causative factors are essential components of care of patients receiving neuraxial analgesia.

REFERENCES:
1. Anesthesiology 1998; 88: 688-95