

11-2012

Is chest tube insertion with ultrasound guidance safe in patients using clopidogrel?

Wissam Abouzgheib

Yousef R. Shweihat

Marshall University, shweihat@marshall.edu

Nikhil Meena

Thaddeus Barrter

Follow this and additional works at: https://mds.marshall.edu/int_med



Part of the [Internal Medicine Commons](#), and the [Pulmonology Commons](#)

Recommended Citation

Abouzgheib, W., Shweihat, Y.R., Meena, N. and Barrter, T., 2012. Is chest tube insertion with ultrasound guidance safe in patients using clopidogrel?. *Respirology*, 17(8), pp.1222-1224.

This Article is brought to you for free and open access by the Faculty Research at Marshall Digital Scholar. It has been accepted for inclusion in Internal Medicine by an authorized administrator of Marshall Digital Scholar. For more information, please contact zhangj@marshall.edu, beachgr@marshall.edu.

ORIGINAL ARTICLE

Is chest tube insertion with ultrasound guidance safe in patients using clopidogrel?

WISSAM ABOUZGHEIB,¹ YOUSEF R. SHWEIHAT,² NIKHIL MEENA² AND THADDEUS BARTTER²

¹Cooper University Hospital, Camden, New Jersey, and ²University of Arkansas for Medical Sciences and the Central Arkansas Veterans Hospital System, Little Rock, Arkansas, USA

ABSTRACT

Background and objective: Drainage of the pleural space is a common procedure. The safety of chest tube insertion in patients using clopidogrel has not been investigated.

Methods: Ultrasound-guided chest tube insertions performed on 24 patients who were being actively treated with clopidogrel were retrospectively reviewed.

Results: No excessive bleeding occurred in any of these patients.

Conclusions: Given the known effects of clopidogrel on platelet function, these results were interpreted as indicating that clopidogrel therapy is a relative but not an absolute contraindication to chest tube insertion, if an experienced operator places a small-bore tube under ultrasound guidance.

Key words: clopidogrel, pleural effusion, small-bore chest tube, ultrasound guidance.

INTRODUCTION

Pleural effusion is a common finding; in the United States, approximately 1 million pleural effusions are diagnosed every year. The causes of pleural effusion range from benign to malignant to infectious. The investigation and treatment of pleural effusions involve sampling or drainage of the pleural fluid by placing a needle or catheter into the pleural cavity.

Antiplatelet therapy is a common intervention for patients who have had stents inserted, as well as those with other cardiovascular diseases.¹⁻³ Clopidogrel therapy clearly increases the risk of bleeding during some surgical procedures, but the question of whether it increases the risk of bleeding during chest tube insertion has not been addressed. Currently, the insertion of a small-bore chest tube with ultrasound

SUMMARY AT A GLANCE

Withholding clopidogrel for 5–7 days in patients requiring chest tube insertion for clinically significant pleural problems may be impractical. This study has shown that in experienced hands, insertion of small-bore chest tubes under ultrasound guidance is safe in this group of patients.

guidance is the standard of care for treatment of most pleural effusions, and this procedure is associated with a very low complication rate.

We retrospectively evaluated our clinical experience with ultrasound-guided small-bore chest tube drainage of pleural effusions in patients who were receiving clopidogrel therapy at the time of the procedure. The primary question was whether or not the risk of bleeding was great enough to alter clinical practice.

METHODS

The study was approved by the Institutional Review Board at each of the two institutions (University of Arkansas for Medical Sciences and Sparks Health System). A retrospective review of the medical records identified patients who had undergone chest tube drainage of the pleural space at either institution between 2009 and 2011. This list was further refined to include patients who were taking clopidogrel at the time of chest tube insertion; these patients comprised the study group. All procedures were performed with ultrasound guidance and under the direct supervision of one of two interventional pulmonologists (W.A. or T.B.).

Our standard procedure included investigating the chest by ultrasound examination, identifying the effusion, the diaphragm and a position in the lateral chest, if lateral access was possible. A position anterior to the point at which the ribs angle anteriorly and anterior to the latissimus dorsi muscle was chosen. Doppler studies of the intercostal arteries were not

Correspondence: Wissam Abouzgheib, Cooper University Hospital, 3 Cooper Plaza Suite 312, Camden, NJ 08103, USA. Email: abouzgheib-wissam@cooperhealth.edu

Received 12 February 2012; invited to revise 29 March 2012; revised 15 April 2012; accepted 10 May 2012 (Associate Editor: Ioannis Kalomenidis).

performed. The site was then marked, prepared and draped, and a pigtail catheter was inserted. Ultrasound guidance was used prior to but not during insertion of the catheter.

The monitored parameters, when documented, were age, gender, suspected diagnosis, pre- and post-procedure haemoglobin concentrations, the need for transfusion, and final diagnosis. Major clopidogrel-related complications were predefined as a reduction in haemoglobin concentration of >20 g/L, any reduction requiring transfusion, bleeding necessitating admission to the intensive care unit or the need for another procedure in order to stop the bleeding. Minor complications were predefined as a reduction in haemoglobin concentration of >10 but <20 g/L within 24 h of chest tube insertion and/or local bleeding (oozing) lasting more than 10 min. Other recorded complications, if documented, included pain, local infections and the development of empyema. The study design included a group of control patients who were not taking clopidogrel, but given the results of the study, this comparison did not add value to the findings.

RESULTS

A review of the medical records identified a total of 18 patients who underwent 24 ultrasound-guided chest tube insertions while receiving clopidogrel therapy. Chest tubes were inserted for drainage of pleural fluid in 22 patients and for pneumothorax in two patients. One patient required three separate insertions, and two other patients required two drainage procedures each (one for reaccumulation of fluid and the other due to dislodgement of the tube). Thirteen of the 18 patients were taking aspirin at differing doses in addition to clopidogrel. The average age of the patients was 73.1 years, and there were 8 men and 10 women. The most common indications for the procedure were pending or active respiratory failure (11/24) and rapidly worsening dyspnoea, which were both intolerable to the patient and thought to be directly related to a problem in the pleural space (10/24). One patient had a large pneumothorax that necessitated drainage twice due to dislodgement of the tube less than 1 day after successful insertion and continued collapse of the lung with an air leak.

Nine procedures were performed with number 8 French chest tubes, one with a number 10 tube, three with number 12 tubes, one with a number 14 tube and 10 with number 16 tubes. The pleural fluid volume was recorded for 21 of the 22 procedures for pleural effusions and averaged 1.02 L per procedure. There was one malignant effusion and two parapneumonic effusions, while the remaining effusions were thought to be secondary to congestive heart failure. The patients' average haemoglobin concentration was 100 g/L prior to the procedure and 102 g/L after the procedure. No primary or secondary complication was documented for any of the patients. One patient who had a chest tube inserted for pneumothorax had a prolonged air leak that was suggestive of a bronchopleural fistula.

DISCUSSION

Thoracentesis and chest tube insertion are common procedures for diagnostic and therapeutic indications. Patients in whom pleural drainage is withheld while the antiplatelet effect of clopidogrel dissipates (5–7 days) may experience a prolongation of their hospital stay and delays in diagnosis and treatment. In some situations, delays in pleural drainage may lead to a preventable decompensation such as intensive care unit admission or the need for initiation of mechanical ventilation. The results of this retrospective study suggest that it is safe, when indicated, for an experienced operator using ultrasound guidance to insert small-bore chest tubes in patients being treated with clopidogrel.

The emergence of drugs that impede adenosine diphosphate-mediated platelet aggregation, such as clopidogrel, has led to meaningful decreases in stent occlusion and cardiovascular events in patients with atherosclerosis.^{1,4} Clopidogrel therapy results in an increased bleeding risk that is intermediate between the risk for aspirin and that for full anticoagulation. Investigators from different disciplines have attempted to assess the risk of bleeding associated with clopidogrel therapy.^{5–8} An interesting study by Kwak *et al.*⁹ demonstrated that different patients have different sensitivities to clopidogrel and that the risk of bleeding is directly proportional to the efficacy of the drug. The implication is that the risk of bleeding may depend on the genetic make-up of the population being studied.

A sentinel study by Ernst *et al.* alerted the pulmonary community to the risks of bleeding due to use of clopidogrel.¹⁰ That study was stopped early when a definite increase in the risk of bleeding was noted during transbronchial lung biopsies on patients taking clopidogrel. Moderate or severe bleeding occurred in 61% of patients taking clopidogrel alone, in 100% of patients taking clopidogrel plus aspirin and in 1.8% of patients taking neither of these drugs. The *P*-values for the most important findings were <0.001 despite the early termination of the study. Whether these findings are applicable to other procedures has not been established; the present study suggests that the risk associated with pleural drainage is less than that associated with transbronchial biopsy.

There are three factors that may be relevant to the lack of complications in the patients who were studied. The factor that may be the least well appreciated is the anatomy of the intercostal arteries, the vessels most likely to be the source of excessive bleeding during chest tube insertion. In children, the intercostal arteries are usually concealed behind the lower ribs and are not directly accessible to extrathoracic puncture; however, with advancing age, the arteries may sag below the lower rib borders and may even become tortuous (see Fig. 1). This tendency decreases with increasing distance from the spinal column, and the artery is usually protected, even in older individuals, at the point where the ribs angle forward.¹¹ Our practice is to perform all chest tube insertions (and thoracenteses) laterally at or anterior to the posterior axillary line, unless loculations necessitate a posterior



Figure 1 Tortuous intercostal arteries.

approach. Ultrasound guidance is essential for this approach and is a second factor that we believe would decrease the incidence of complications due to chest tube insertion. Finally, the clinicians involved have had extensive experience with pleural procedures. The combination of these three factors may account for the lack of significant complications among the patients in this small series.

This study has several limitations. First, it was a retrospective study. Second, a large number of cases will need to be studied to detect a significant increase in the risk associated with chest tube insertion. In a small series such as this, which involved 24 insertions, a rate of bleeding of 4% could be missed. The number of patients in this series was small because pleural procedures would generally be avoided in patients taking clopidogrel. It has been reported that bleeding complications of thoracentesis and small-bore chest tube insertion are rare even when the patient has a coagulopathy.¹² It should also be noted that in the study by Ernst *et al.*, bleeding occurred in 61% of patients taking clopidogrel alone and in 100% of patients taking clopidogrel plus aspirin; the number of patients in the present study was adequate to indicate that chest tube insertion, as performed at our institution, was far less risky than transbronchial biopsy in a similar patient population. Third, the vast majority of procedures were performed on patients with congestive heart failure. It is not surprising that patients taking clopidogrel for coronary artery disease would have a relatively high incidence of congestive heart failure, but this population might not accurately reflect the range of patients with pulmonary effusions that is encountered by most pulmonologists.

When the present results are assessed in the context of the previous literature, it is our opinion that any intervention that carries an increased risk warrants increased caution; the potential rewards need to justify the increased risk. This negative study should not be regarded as proof that excessive bleeding cannot occur when patients who are taking clopidogrel undergo chest tube insertion. It is assumed that bleeding will occasionally occur whether or not patients are taking clopidogrel and that the use of clopidogrel will increase the severity of that bleeding.

In conclusion, clopidogrel therapy can be regarded as a relative, rather than an absolute, contraindication to chest tube insertion. If there is no urgency, clopidogrel should be withheld for at least 5 days. If a patient who is taking clopidogrel requires immediate chest tube insertion, then (i) the tube should be inserted by an experienced operator, (ii) ultrasound guidance should be used and (iii) the tube should be inserted into the lateral chest wall when this is possible. A randomized controlled trial is required to confirm the safety of drainage of the pleural space for less urgent indications.

REFERENCES

- 1 Krotz F, Sohn HY, Klaus V. Antiplatelet drugs in cardiological practice: established strategies and new developments. *Vasc. Health Risk Manag.* 2008; **4**: 637–45.
- 2 Mohammad RA, Goldberg T, Dorsch MP *et al.* Antiplatelet therapy after placement of a drug-eluting stent: a review of efficacy and safety studies. *Clin. Ther.* 2010; **32**: 2265–81.
- 3 Fox KA, Mehta SR, Peters R *et al.* Benefits and risks of the combination of clopidogrel and aspirin in patients undergoing surgical revascularization for non-ST-elevation acute coronary syndrome: the clopidogrel in unstable angina to prevent recurrent ischemic events (CURE) trial. *Circulation* 2004; **110**: 1202–8.
- 4 Aronow WS. Office management of peripheral arterial disease. *Am. J. Med.* 2010; **123**: 790–2.
- 5 Chu EW, Telem DA, Chernoguz A *et al.* Assessing the risk of clopidogrel-related bleeding complications in patients undergoing inguinal herniorrhaphy. *Hernia* 2011; **15**: 31–5.
- 6 Chernoguz A, Telem DA, Chu E *et al.* Cessation of clopidogrel before major abdominal procedures. *Arch. Surg.* 2011; **146**: 334–9.
- 7 Korantzopoulos P, Letsas KP, Liu T *et al.* Anticoagulation and antiplatelet therapy in implantation of electrophysiological devices. *Europace* 2011; **13**: 1669–80.
- 8 Rosenbaum A, Rizvi AZ, Alden PB *et al.* Outcomes related to antiplatelet or anticoagulation use in patients undergoing carotid endarterectomy. *Ann. Vasc. Surg.* 2011; **25**: 25–31.
- 9 Kwak YL, Kim JC, Choi YS *et al.* Clopidogrel responsiveness regardless of the discontinuation date predicts increased blood loss and transfusion requirement after off-pump coronary artery bypass graft surgery. *J. Am. Coll. Cardiol.* 2010; **56**: 1994–2002.
- 10 Ernst A, Eberhardt R, Wahidi M *et al.* Effect of routine clopidogrel use on bleeding complications after transbronchial biopsy in humans. *Chest* 2006; **129**: 734–7.
- 11 Yoneyama H, Arahata M, Temaru R *et al.* Evaluation of the risk of intercostal artery laceration during thoracentesis in elderly patients by using 3D-CT angiography. *Intern. Med.* 2010; **49**: 289–92.
- 12 McVay PA, Toy PT. Lack of increased bleeding after paracentesis and thoracentesis in patients with mild coagulation abnormalities. *Transfusion* 1991; **31**: 164–71.