
Rib stress fractures in pregnancy: a case report and review of literature

S. Pouwels¹, Y.A. Dabekausen²

¹ Department of Surgery, Catharina Hospital, Eindhoven; ² Department of Gynaecology, Gelre Hospital, Zutphen (The Netherlands)

Summary

Thoracic pain in pregnancy has a broad differential diagnosis. The authors report a young pregnant woman with acute pain in the thoracic region due to a rib fracture after a coughing flare. Physicians must be aware of the broad differential diagnosis (and its clinical consequences) of thoracic pain in pregnancy. Radiographic imaging is not necessary if the clinical signs are obvious. If there is no suspicion for underlying pathology other (expensive) diagnostic tests lose their value. Treatment consists of adequate analgesia and no further measures need to be taken.

Key words: Rib stress fracture; Stress fracture; Pregnancy.

Introduction

Stress fractures are common injuries in athletes and military recruits. A stress fracture can be defined as a partial or complete fracture of the bone that is a result from repeated application of stress lower than that required to fracture the bone in a single loading situation [1]. The most common site of stress fractures are the tibia followed by the metatarsal and tarsal bones [2, 3]. Rib fractures are often related to chest trauma, but less common causes of rib fractures have been described in the literature. Stress fractures of the rib have been related to sports such as golf, rowing, pitching, swimming, and bodybuilding [4-9]. Only a few reports discuss rib fractures due to coughing [10-14]. In pregnancy, the body is subjected to various physiological changes that make women more vulnerable. Physicians must be aware of a stress fracture in pregnancy, because it is often missed. The authors report a young pregnant woman with acute pain in the thoracic region due to a rib fracture after a coughing flare.

Case Report

A 30-year-old, 74 kg woman (G3, P1) presented at 34 weeks amenorrhoea with acute sharp pain over the anterolateral aspect of the right chest wall after an irritating, unproductive cough during her visit with her general physician. She felt a click at the right side of her chest and this was followed by persistent pain. She did not have previous trauma and any other underlying disease. She was having trouble breathing when lying down, but in sitting position, she could breathe normally. The pain was aggravated by coughing and local pressure.

Physical examination showed normal heart tones, no murmurs and a normal blood pressure. Oxygen saturation was 98%. A small bump was palpable over her right chest, was very painful, and

also crackles were heard on that exact spot. Her blood work was normal. Because of the clinical signs and to limit radiologic exposure during pregnancy, the general physician chose not to make chest radiography.

In a previous pregnancy the woman had a pyelonephritis and that is why a midstream urine sample was sent to the laboratory for investigation. No abnormalities were seen at the microscopy of the midstream urine sample. The general physician advised her take appropriate analgesia and advised to start with acetaminophen. Three weeks later, she had an appointment with her own gynaecologist. The general physician consulted the gynaecologist to discuss with the patient in advance what kind of analgesia would be appropriate for the labour. At that appointment, she still had complaints of localised chest pain over anterior aspect of the right chest wall, but in the past three weeks the pain decreased. Seven days later, at 38 weeks amenorrhoea, epidural analgesia was infused for analgesia before delivery. On that same day, she gave birth to her daughter. The next day she and her daughter left the hospital in good health.

Discussion

Pain in the thoracic and lumbar regions has a broad differential diagnosis, with each different clinical consequence. In pregnancy, there are many physiological changes that a medical professional has to keep in mind. Estrogen and progesterone have different influences on the gallbladder function and the changes in those hormones encourage stone formation [15, 16]. Preeclampsia or HELLP syndrome can cause acute pain in the liver region [17]. This can be pain similar to that caused by bile stones of cholecystitis. As pregnancy advances, the enlarging uterus displaces the appendix caudally and these anatomic changes, compounded by the limited radiologic exposure and non-specific complaints, pose diagnostic

difficulties [18, 19]. During pregnancy there is an increased risk of pulmonary embolisms due to stasis of blood in the veins and changes in physiology of blood coagulation [20]. Physicians need to pay attention to the broad differential diagnosis of chest pain in pregnancy. Also non-specific pains can give diagnostic difficulties.

The present patient's blood work was normal and the clinical signs were so specific for a rib fracture, that chest radiography was not necessary in the authors' opinion. One reason was the earlier mentioned radiographic exposure and although chest radiography is easily available, it has been reported that it has a low sensitivity for diagnosing rib fractures [21]. Computed tomography (CT) has been documented as a alternative technique for detecting rib fractures with a high sensitivity [22]. In the present authors' opinion, the value of an additional CT was very low, because it would not change neither the treatment nor the choice for anaesthesia for labour. Also other diagnostic tests were not necessary, because of the very specific clinical signs. A learning point is this specific case, is that an adequate diagnosis can be obtained, just with a precise anamnesis and physical examination, without extensive use of additional blood investigation and/or imaging modalities. Secondly, if additional investigation (in terms of blood work and imaging) is necessary, choose wisely, because you are easily 'over' treating patients.

A stress rib fracture is a rare cause of pain in the thoracic-lumbar region during pregnancy. Sometimes it is seen accidentally on chest radiography or diagnosed by a doctor who has seen a similar case in his/her career. Long *et al.* [23] described 35 cases of patients with a rib fracture due to coughing during the third trimester of pregnancy. The most of these patients had fractures of ribs VIII to XI, while in non-pregnant women, ribs VI and VII were fractured most of the time [23-25].

Most of the time, the rib fracture has a mechanic cause. [23-27] Even-Tov *et al.* [26] and Boyle *et al.* [27] described the (patho)mechanic changes of the rib cage during pregnancy. The ribs are moved cranially and more horizontally due to the enlarging uterus. The lower ribs are pulled in a cranial direction by the intercostal, serratus anterior, and the latissimus dorsi muscles, while the external oblique and internal oblique muscles pull the rib cage in the contralateral (caudal) direction. This causes a certain tension on the lower ribs, and an unsuspected force, for example coughing or a minor trauma, can cause a fracture [26, 27].

The treatment of a stress rib fracture consists of good analgesia. In the current literature, there is no agreement on what kind of analgesia is the most effective. In a case report of Amagada *et al.* [28], the patient received epidural analgesia during labour, like in the present patient, but there are no recommendations of appropriate analgesia during pregnancy.

Conclusion

Thoracic pain in pregnancy has a broad differential diagnosis and a rib stress fracture is a rare cause of thoracic pain in pregnancy. Physicians must be aware of this. Radiographic imaging is not necessary if the clinical signs are obvious. If there is no suspicion for underlying pathology other (expensive) diagnostic tests lose their value. Treatment consists of adequate analgesia and no further measures need to be taken.

References

- [1] Martin A.D., McCulloch R.G.: "Bone dynamics: stress, strain and fracture". *J. Sports Sci.*, 1987, 5, 155.
- [2] Iwamoto J., Takeda T.: "Stress fractures in athletes: review of 196 cases". *J. Orthop. Sci.*, 2003, 8, 273.
- [3] Iwamoto J., Takeda T., Sato Y., Matsumoto H.: "Retrospective case evaluation of gender differences in sports injuries in a Japanese sports medicine clinic". *Gen. Med.*, 2008, 5, 405.
- [4] McDonnell L.K., Hume P.A., Nolte V.: "Rib stress fractures among rowers: definition, epidemiology, mechanisms, risk factors and effectiveness of injury prevention strategies". *Sports Med.*, 2011, 41, 883.
- [5] Lord M.J., Ha K.I., Song K.S.: "Stress fractures of the ribs in golfers". *Am. J. Sports Med.*, 1996, 24, 118.
- [6] Holden D.L., Jackson D.W.: "Stress fracture of the ribs in female rowers". *Am. J. Sports Med.*, 1985, 13, 342.
- [7] Moore R.S.: "Fracture of the first rib: an uncommon throwing injury". *Injury*, 1991, 22, 149.
- [8] Goesser C.D., Aikenhead J.A.: "Rib fracture due to bench pressing". *J. Manipulative Physiol. Ther.*, 1990, 13, 26.
- [9] Chaudhury S., Hobart S.J., Rodeo S.A.: "Bilateral first rib stress fractures in a female swimmer: a case report". *J. Shoulder Elbow Surg.*, 2012, 21, e6-10.
- [10] Roberge R.J., Morgenstern M.J., Osborn H.: "Cough fracture of the ribs." *Am. J. Emerg. Med.*, 1984, 2, 513.
- [11] Oren V., Kozenitzky I., Babiacki A., Stern A.: "Unusual cough related stress injuries." *Eur. J. Nucl. Med.*, 1988, 14, 108.
- [12] Litch J.A., Tuggy M.: "Cough induced stress fracture and arthropathy of the ribs at extreme altitude". *Int. J. Sports Med.*, 1998, 19, 220.
- [13] Begley A., Wilson D.S., Shaw J.: "Cough fracture of the first rib". *Injury*, 1995, 26, 565.
- [14] Kawahara H., Baba H., Wada M., Azuchi M., Ando M., Imura S.: "Multiple rib fractures associated with severe coughing--a case report". *Int. Orthop.*, 1997, 21, 279.
- [15] Affleck D.G., Handrahan D.L., Egger M.J., Price R.R.: "The laparoscopic management of appendicitis and cholelithiasis during pregnancy." *Am. J. Surg.*, 1999, 178, 523.
- [16] Ko C.W., Beresford S.A., Schulte S.J., Matsumoto A.M., Lee S.P.: "Incidence, natural history, and risk factors for biliary sludge and stones during pregnancy". *Hepatology*, 2005, 41, 359.
- [17] Marik P.E.: "Hypertensive disorders of pregnancy". *Postgrad Med.*, 2009, 121, 69.
- [18] McGory M.L., Zingmond D.S., Tillou A., Hiatt J.R., Ko C.Y., Cryer H.M.: "Negative appendectomy in pregnant women is associated with a substantial risk of fetal loss". *J. Am. Coll. Surg.*, 2007, 205, 534.
- [19] Gilo N.B., Amini D., Landy H.J.: "Appendicitis and cholecystitis in pregnancy". *Clin. Obstet. Gynecol.*, 2009, 52, 586.
- [20] Greer I.A.: "Thrombosis in pregnancy: updates in diagnosis and management". *Hematology Am. Soc. Hematol. Educ. Program*, 2012, 2012, 203.
- [21] Connolly L.P., Connolly S.A.: "Rib stress fractures". *Clin. Nucl. Med.*, 2004, 29, 614.

- [22] Hanak V., Hartman T.E., Ryu J.H.: "Cough-induced rib fractures". *Mayo Clin. Proc.*, 2005, 80, 879.
- [23] Long A.E.: "Stress fracture of the ribs associated with pregnancy". *Surg. Clin. North Am.*, 1962, 42, 909.
- [24] Baitner A.C., Bernstein A.D., Jazrawi A.J., Della Valle C.J., Jazrawi L.M.: "Spontaneous rib fracture during pregnancy. A case report and review of the literature". *Bull. Hosp. Jt. Dis.*, 2000, 59, 163.
- [25] Van de Laar R., De Munck D.R.A.J., Oei S.G.: "Een ongewone oorzaak van pijn in de thoracale en lumbale region bij een zwangere patiënte". *MMC Med J.*, 2003, 32, 173. [In Dutch]
- [26] Even-Tov I., Yedwab G.A., Persitz E., David M.P.: "Stress fracture of ribs in late pregnancy". *Int. Surg.*, 1979, 64, 85.
- [27] Boyle R.K.: "Cough stress rib fractures in two obstetric patients: case report and pathophysiology". *Int J Obstet Anesth.*, 1998, 7, 54.
- [28] Amagada J.O., Joels L., Catling S.: "Stress fracture of rib in pregnancy: what analgesia?" *J. Obstet. Gynaecol.*, 2002, 22, 559.

Corresponding Author:
S. POUWELS, M.D.
Department of Surgery, Catharina Hospital
Michelangelolaan 2
P.O. Box 1350
5602 ZA Eindhoven
(The Netherlands)
e-mail: Sjaak.pouwels@catharinaziekenhuis.nl