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Transpedicular Percutaneous Vertebral Biopsy: About Six Cases

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Abstract

The vertebral biopsy is the method of choice to confirm the diagnosis of localized infectious and tumoral lesions of the spine. It can be performed percutaneously or in the open. The percutaneous route has largely supplanted surgical biopsy with a minimally invasive spinal approach and diagnostic efficiency. The transpedicular biopsy is the most classic. We report our experience through a series of six cases of transpedicular vertebral biopsy collected during a two-year period in the neurosurgery department at Mohamed VI University Hospital in Oujda Morocco.

Keywords: Vertebral Biopsy, Spinal Lesion, Transpedicular Percutaneous Biopsy

1. Introduction

The vertebral biopsy provides a tissue sample for histopathological and/or bacteriological examination of the spine lesion. It is indicated in patients who present for spinal pain and whose biological and radiological explorations remain non-specific, and requires a histological and microbiological evaluation for diagnostic confirmation and allow for adequate therapeutic management (Möller et al., 2001; Kamei et al., 2015). The open biopsy is the standard gold for wide tissue sampling and a diagnostic certainty rate of 98% but is still associated with a high rate of complications and morbidity (Chooi et al., 2007; Yapici et al., 2015). The Percutaneous biopsy is considered to be a less invasive, safer and low-cost technique (Hadjipavlou et al., 2003). The transpedicular pathway represents a particularly interesting pathway for biopsy of thoracic and lumbar vertebral lesions with high sensitivity and specificity and a low rate of complications (Pierot and Boulin, 1999; Shrestha, Shrestha and Dhoju, 2015).

2. Patients and Method

This is a retrospective study of six cases of transpedicular percutaneous vertebral biopsies performed over a period of two years in the neurosurgery department at the Mohammed VI Oujda University Hospital center.

3. Results

Six cases were collected in our study, including three men and three women. The sex ratio was 1. The average age was 55. A history of breast carcinoma was noted in one case. The average consultation delay time was 8

months. The clinical picture was dominated by spinal pain in all six cases, at the lumbosacral spine. There wasn't any neurological deficit. All of our patients received a CT scan of the spine completed by an MRI. The vertebral lesions were localized in the lumbosacral spine: the 5th lumbar vertebra was the most common. Our patients had transpedicular percutaneous vertebral biopsy by trocar under fluoroscopy guidance. Three of our patients (50%) had a biopsy of two vertebrae. Biopsies established a diagnosis in all six cases (100%).

The results were represented by:

- Tuberculosis Spondylodiscite: one case.
- Non-specific infectious spondylodiscite: two cases.
- Metastasis breast carcinoma: one case.
- Large cell lymphoma: one case.
- Plasmocytom: one case.

No post-operative complications were noted.

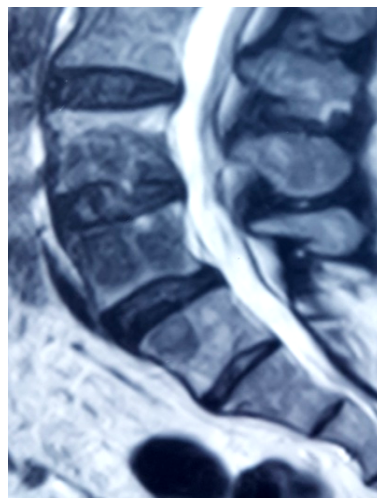


Figure 1. Lumbar MRI showing hypointense lesion of L4 and L5 vertebral bodies

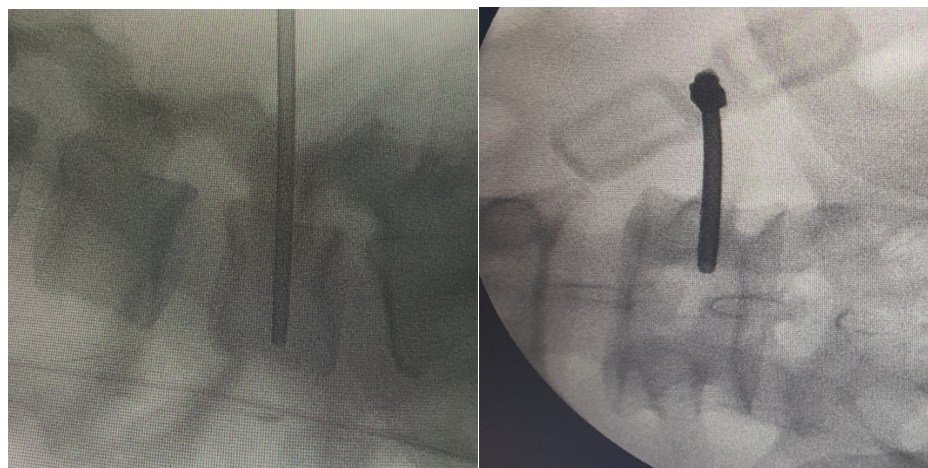


Figure 2. Transpedicular percutaneous vertebral biopsy of L5 under fluoroscopic guidance face and profil, result of biopsy: metastasis of breast carcinoma

4. Discussions

The percutaneous biopsy was first performed in 1935 by Robertson and Ball and, Several pathways were described as posterolateral, transcostovertebral and transpedicular (Chamakeri et al., 2017). The study of spinal

morphometrics has led to a better understanding of the anatomy of the pedicle and its potential as a pathway for spinal lesion biopsy (Kamei et al., 2015). Currently, the transpedicular approach is considered as an interesting alternative compared to other pathways to perform a biopsy of thoracic and lumbar vertebral lesions with high sensitivity and specificity (Dave et al., 2009). In addition, the transpedicular pathway prevents complications associated with paravertebral biopsies, particularly at the thoracic level (Chooi et al., 2007).

Stringham et al. and Jelinek et al. reported the first series of transpedicular percutaneous vertebral biopsy (Stringham et al., 1994; Jelinek et al., 1996). The transpedicular biopsy can be performed under local anesthesia with a short hospital stay, making it the technique of choice given to its low cost and the possibility of monitoring nerve roots. General anesthesia is usually used for children and for patients who are unable to stand still during the procedure (Möller et al., 2001).

The transpedicular percutaneous vertebral biopsy can be done under fluoroscopic or scannographic guidance. The fluoroscopy guidance technique, characterized by its availability and accessibility, allows instant and continuous control of the position of the biopsy trocar with a short procedure time, that it is as effective as scan guidance (Tehranzadeh et al., 2007).

Nourbakhsh et al. (Nourbakhsh et al., 2008) proved that there is no difference in diagnostic rate or quality of removal of vertebral biopsies performed under fluoroscopy or CT. In addition, the fluoroscopy biopsy has been others advantage such as the aseptic environment of the operating room and low cost.

The diagnostic rate of transpedicular percutaneous biopsies varies as described in the literature. Kamei et al. (Kamei et al., 2015) and Moller et al. (Möller et al., 2001) reported a rate of 93.8%, but for Pierot (Pierot and Boulin, 1999) the rate was 89%. A lower rate may be due to the use of a small diameter trocar. The vertebral sample with a diameter of 2 mm or more can be used to achieve high diagnostic accuracy. Stringham et al. reported that a biopsy trocar diameter of 3 mm as average allows to collect a tissue sample of 2mm, which is compatible with the majority of pedicles at the thoracic and lumbar level (Stringham et al., 1994). Also, it allows a secure insertion of the biopsy of the vertebral body. Moller et al. obtained an adequate tissue sample for 91.2% of the biopsies performed (Möller et al., 2001).

Several types of biopsy instruments are available to perform a percutaneous spinal biopsy, but an adequate bone sample with minimal crushing effect should be the primary objective when choosing the instruments for biopsy (Shrestha et al., 2015).

A small diameter sample may be adequate for the diagnosis of tuberculosis, myeloma, osteomyelitis, but when more histological details are required, such as for a malignant tumor, a larger diameter sample is required (Möller et al., 2001).

The diagnostic rate of osteolytic lesions is 94% and sclerotic lesions are 75%. The sclerotic lesions are more difficult to biopsy, hence the value of using trocars and needles for biopsy (Kamei et al., 2015) (Dave et al., 2009).

In spinal tuberculosis, histological and bacteriological examination is rarely diagnostic. The search for the DNA of mycobacterium tuberculosis through PCR is of considerable input. The culture of biopsy sampling in nonspecific germ infectious spondylodiscite yields the best results. Staphylococcus aureus is the most common germ. In tumor lesions, histological examination remains the method of choice (Chooi et al., 2007).

The complication rate of transpedicular vertebral biopsies is estimated between 0.2% and 5.9%. Complications include pneumothorax, active bleeding, hematoma, vascular wound, nerve damage (radicular or spinal cord), and infection. Some cases of transient paraparesis, transient paraplegia, meningitis, and death have also been reported (Möller et al., 2001; Kamei et al., 2015).

The decrease in the rate of complications, reported in the series, is related to the experience gained during transpedicular screwing osteosynthesis and the improvement of knowledge of vertebral morphometrics, as well

as the choice of a vertebra to biopsy after a good radio-clinical evaluation (Chamakeri et al., 2017). Transpedicular biopsy by a unilateral approach provides access to more than 50% of spinal body lesions. An appropriate tissue sample can be obtained by the variation in the direction of the biopsy. However, some areas of the vertebral body are inaccessible by transpedicular route, such as the upper and lower areas of the posterior part of the vertebral body as well as the area in front of the spinal canal, from which to consider other (Kamei et al., 2015; Shrestha et al., 2015).

Finally, the anatomical relationship of the pedicle with the nervous elements underlines the importance of maintaining the integrity of the inner and lower wall of the pedicle.

5. Conclusion

The vertebral biopsy is the examination of choice to confirm the diagnosis of infectious and tumor lesions of the spine. It can be done percutaneously or open surgery procedures. Percutaneous biopsy largely replaced surgical biopsy because it is less invasive with less complication. Transpedicular biopsy gives a better efficiency rate in terms of diagnostic, which allows for appropriate therapeutic management. A transpedicular biopsy allows the reach of most spinal lesions with sufficient tissue sampling for diagnosis. The low risk of complications makes the transpedicular approach an effective alternative to other procedures.

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