

Early Detection of Lumbar Discitis by MRI

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Introduction

MRI is the imaging modality of choice to detect the presence of disc infection following discography or discectomy. When to perform the examination remains controversial. The aim of this study is threefold.

To determine :-

What is the earliest stage at which discitis is visible on MRI.

At what stage discitis is reliably excluded.

What is the most sensitive imaging technique.

Methods

A sheep model was utilised for the study. In each of two sheep one lumbar disc was injected with radiographic contrast contaminated with *Staphylococcus epidermidis* (ATCC 14990) to simulate discography. A second disc underwent partial discectomy, which was infected with bacteria. Two other levels underwent discography and discectomy without contamination. At days five, seven, nine and twelve after the surgery, the animals were anaesthetised and MR scans were obtained on a Siemens Magnetom Vision (Erlangen, Germany) using commercial Numaris VB33D software and parameters commonly used for human clinical imaging. The sequences included Fast STIR, T2 TSE, T1 TSE, T1 SE and T1 FLASH (Spoiled Gradient Echo). The sheep were killed twelve days after inoculation and the lumbar spines were prepared for histologic examination. Identical MR scans were performed on a resected spine taken from another animal that died seven days after partial discectomy with bacterial contamination.

Results

In one of the live animals, MR signal changes were noted on the STIR images at the discography and discectomy levels from day five. T1-weighted scans showed probable changes at both levels from day seven and the T2-weighted image showed changes from day nine. In the other live animal STIR and T1 (TSE) showed changes from day seven at both inoculated levels. The T2-weighted image in this animal was altered at the discography level only at day nine. The signals from the partial discectomy level did not show any changes until day twelve. There was good correlation between MR changes and the degree and distribution of histologic at day twelve. The post-mortem scans of the third spine taken at day seven showed clear changes on STIR and T2-weighted sequence, and possible changes on the other T1-weighted sequences. These changes also correlated with the histologic appearance. Congruence between live tissue and resected spine was established in an earlier study. (1)

Discussion

It should be noted that this study was performed in sheep, and the earliest STIR changes occurred in the cartilaginous end plate, a structure that is much larger in sheep than in humans, hence any extrapolation to human imaging should be treated with caution.

Conclusion

STIR is a sensitive MR sequence that can be used to detect discitis following discectomy or discography at an early stage. Early detection of discitis should provide for timely treatment of disc space infection.

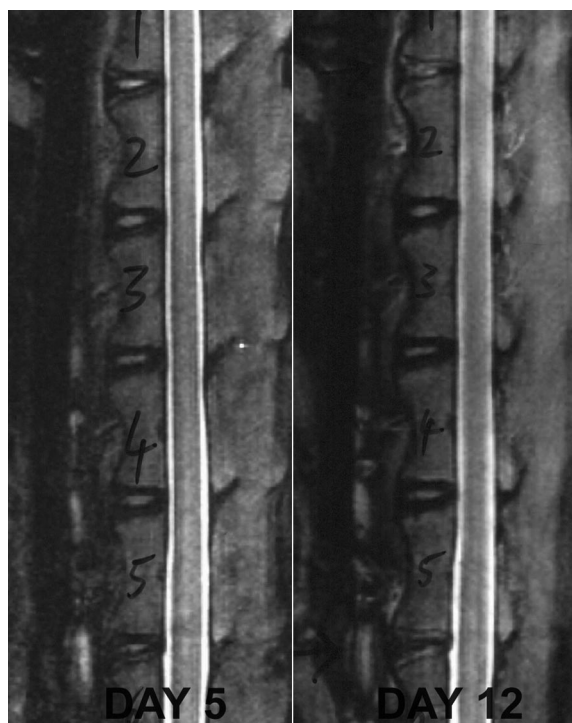


Figure 1. STIR images demonstrating discitis at L1/2 and L5/6. Day 5 and day 12 post discography

Reference

1. Taylor D.J., Brown G., Moore R. Hutchinson., Proc.Intl Soc. Magn. Reson. Med. 7 (1999) 2004

Table 1. Lumbar disc inoculated with bacteria at time of discography. Indicating days after procedure when abnormality first becomes visible.

	STIR	T1 FLASH	T2 TSE	T1 TSE	T1 SE
Sheep 1	7	9	9	7	n.a.
Sheep 2	5	9	7 - 9	7	7

Table 2. Lumbar disc inoculated with bacteria at time of discectomy. Indicating days after procedure when abnormality first becomes visible.

	STIR	T1 FLASH	T2 TSE	T1 TSE	T1 SE
Sheep 1	7	12	12	12	n.a.
Sheep 2	5	12	9	7	7
Sheep 3 (killed at day 7)	7	-	7	-	-