Case Report

Case of the week: Updating a cervical MR scan avoided unnecessary cervical surgery

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INTRODUCTION

Most spinal surgeons have likely seen cases in which successive MR studies documented the spontaneous regression/resorption of cervical/lumbar disc herniations. The spinal literature focuses on lumbar disc herniations (LDH) that demonstrate spontaneous regression on MR studies 34.7–95% of the time over 6–17 months intervals, with full resolution being seen in 43–75% of cases. As cervical disc herniations likely demonstrate similar resorption/resolution on successive MR studies, old cervical MR examinations should probably be updated/repeated in patients who are being considered for cervical surgical intervention. If/when cervical discs have resorbed, cervical surgery may be avoided.

CASE STUDY

A young patient (e.g. under 30 years of age) had a history of multiple prior traumatic events over the last 3 years. Trauma 10 months previously led to a cervical MR 9 months ago; it demonstrated an original large central C4-C5 disc herniation with significant cord/root compression. Despite pain and mild radiculopathy, the patient had no focal neurological deficit, and did not undergo surgery. When the patient recently consulted multiple spinal orthopedists and neurosurgeons, the uniform recommendation was for a C4-C5 anterior cervical discectomy/fusion (ACDF). However, a telemedicine consultation with a spinal neurosurgeon resulted in a follow-up cervical MR scan that demonstrated cervical disc resorption, and, therefore, no need for cervical surgical intervention. When the new study showed full resolution of the C4-C5 disc, the telemedicine and local neurosurgeon agreed that cervical surgery was unnecessary.

Conclusion: The spinal literature shows that predominantly lumbar disc herniations (LDH) spontaneously regress on MR studies 34.7–95% of the time over 6–17 month intervals, with full resolution being seen in 43–75% of cases. As cervical disc herniations likely demonstrate similar resorption/resolution on successive MR studies, old cervical MR examinations should probably be updated/repeated in patients who are being considered for cervical surgical intervention. If/when cervical discs have resorbed, cervical surgery may be avoided.

Keywords: Cervical spine, Non-surgical, Spontaneous disc resolution, Surgery, Unnecessary, Updated MR
a large central disc herniation at the C4-C5 level [Figures 1 and 2]. Although the patient complained of pain with radiculopathy, she had no significant focal neurological deficits, and was, therefore, managed conservatively.

Six months later, still with complaints of pain and radiculopathy but no focal neurological deficit, the patient was seen by several spinal orthopedists and neurosurgeons; they uniformly recommended a C4-C5 ACDF (anterior cervical discectomy/fusion). However, the patient’s telemedicine neurosurgical consultant recommended obtaining a repeat cervical MR. When this study was performed, if documented full resolution of the C4-C5 disc herniation. Both the telemedicine and neurosurgeon at a local academic medical center concluded that no cervical surgery was indicated. [Figures 3 and 4]. Rather, the patient was referred to neurology for continued conservative management.

DISCUSSION
Regression versus resolution of lumbar disc herniations
Spinal disc herniations on MR studies have been shown to regress in up 34.7–95% of cases over 6–17 months’ duration, with full resolution being seen from 43-75% of the time (e.g. ± 7.2 mos.) [Table 1].[2,5,7] In 2004, Splendiani et al. reviewed 64 patients with MR-documented disc herniations at 72 levels; within 6 months, there was spontaneous regression in 34.7% of cases, with sequestrated discs regressing 100% of the time.[7] Chiu et al. in 2015 reviewed 31 studies focusing on the conservative/non-surgical management of LDH; this excluded any patients with a history of surgery, infections, tumors, lacerations, or systemic conditions.

![Figure 1: The original C4-C5 axial cervical MR study obtained 9 months earlier showed a large central disc herniation at the C4-C5 level. Focal hyperintensity within the disc compressing the ventral cord is readily seen on this image.](image1.png)

![Figure 2: The midline sagittal MR obtained 9 months earlier demonstrated the central C4-C5 cervical disc herniation with significant ventral cord compression.](image2.png)

![Figure 3: The axial cervical MR obtained on follow-up 9 months later demonstrated complete resolution of the C4-C5 herniated disc.](image3.png)

![Figure 4: The midline sagittal MR obtained 9 months later showed full resolution of the prior C4-C5 central disc herniation.](image4.png)
degenerative spondylolisthesis, or stenosis. Spontaneous regression of LDH was observed in 96% of cases; 70% for sequestrated LDH, and 41% for extruded LDH. Of interest, total resolution of discs was most frequently encountered in those with free/sequestrated disc fragments (43%), and a lesser 15% for those with extruded discs. Subsequently, in 2019, Kesikburun et al. demonstrated spontaneous resolution of LDH on successive MR studies performed in 40 patients followed over an average interval of 17 +/- 7.2 months. Patients were divided into 3 groups: Group 1 showed no regression of the LDH (4 patients-10%), Group 2 demonstrated partial regression of LDH (6 patients-15%), while Group 3 patients exhibited complete resolution of LDH (30 patients-75%). Notably, progression/resolution of discs positively correlated with clinical improvement utilizing the numeric rating scale for pain (NRS), and the Oswestry disability index (ODI).

### Case report of delayed LDH regression/ resolution

In Jung et al. study (2017), a 32 year old with a large LDH had refused surgery despite the presence of a cauda equina syndrome [Table 1]. The successive CT and MR studies

| Author Ref | # Cases | Types of cases | Original MR | Follow up MR | Resolution of disc % |
|------------|---------|----------------|-------------|-------------|---------------------|
| Splendiani et al.[7] | Spot Res/Reg LDH | MR Contrast Document LDH Res/ Reg 64 patients 72 LDH MR ±Contrast Con Rx-MR F/O 6 mos | Spont Reg LDH 34.72% Seq Reg 100% Most LDH High Signals on T2 Reg 85.18% | Peripheral Enhancement 83% LDH Reg not Due to: Location, Size Level | MR had Predictive Information LDH Res/Reg |
| Steffen et al.[8] | Spont Reg LDH on MR in Dog | 3 yo French Bull Dog Acute LBP Hyp 3 mos | Ext LDH L34 Cons Rx NSAIDS Restrict Ex Spont Reg 96% Seq LDH 70% Ext LDH 41% | 5 weeks later com res clinical signs | Rep MR 69% Reg Volume of LDH |
| Chiu et al.[9] | Spont Reg LDH Review | Excluded: infections Tumors DS or ST 2 Indep Rev 2 Pain Rx TFESI 4/28 Reg LDH Rate 59% | 4 Pts No Reg LDH on MR but Sx Imp-No Surgery | Spont Reg LDH with Con Rx | Protruding LDH 13% Total Res 43% Seq 15% Ext |
| Hong et al., 2016 | Spont Reg LDH on MR in Dog | 3 yo French Bull Dog Acute LBP Hyp 3 mos | Ext LDH L34 Cons Rx NSAIDS Restrict Ex Spont Reg 96% Seq LDH 70% Ext LDH 41% | 5 weeks later com res clinical signs | Rep MR 69% Reg Volume of LDH |
| Jung et al., 2017 | Case Report 32 yo F Huge LDH | CE Syndrome Refused Surgery | CT and MR NO changes 3, 12 mos | 18 mos Delayed Reg | 2 Yrs Comp Res |
| Oligane et al.[10] | Spont Reg LDH on MR in Dog | CR CA TDH 40 yo F | Spont Res | CA TDH | Large CA TDH Res over 8 mos |
| Babashahi et al.[11] | CA TDH Spont Res | CC Cys Cons Rx Studies CT Huge CA TDH T56 | MR T45-T9/10 CC+Syr | F/O 6 mos Comp Res CA TDH/ Dec Syr | Spont Res 6 mos CA TDH T56 level |
| Kesikburun et al.[12] | Spont Res 2015-18 40 Pts NRS, ODI | Ext LDH on MR Time 17/7.2 Mos Con Rx | 3 G 1 Non Reg 2 Par Reg 3 Com Rex | 1–4 Pts (10%) 2–6 Pts (15%) Par Imp | 3-30 Pts (75%) G3 Imp NRS and ODI |

### Table 1: Summary of literature on resolution/regression of spinal disc herniations.

- **Spont:** Spontaneous, **Res:** Resolution, **LDH:** Lumbar disc herniation, **MR:** Magnetic resonance imaging, **CT:** Computed tomography, **Imp:** Improvement, **ODI:** Oswestry disability index, **NRS:** Numeric rating scale for pain, **Con:** Conservative, **Rx:** Treatment, **Rep:** Repeat, **Pts:** Patients, **Seq:** Sequestrated, **Ext:** Extruded, **mos:** Months G: Groups, **Par:** Partial, **Com:** Complete, **CA:** Calcified, **TDH:** Thoracic disc herniation, **CR:** Case report, **LBP:** Low back pain, **Hyp:** Hyperreflexia/spasticity, **CC:** Cord compression, **Syr:** Syrinx, **F/O:** Follow-up, **Dec:** Decreases, **yrs:** Years, **Reg:** Regression, **CE:** Cauda equina, **TFESI:** Transforaminal epidural steroid injection, **Sy:** Symptoms, **Imp:** Improved, **ND:** Neurological deficits, **DS:** Degenerative spondylolisthesis, **St:** Stenosis, **Indep:** Independent, **Rev:** Reviewers, **Ex:** Exercise, **OP:** Surg.
showed no significant changes at 3, 6, and 12 months. However, finally 18 months later, the MR demonstrated delayed disc regression, followed by complete resorption at 2 years. Of interest, clinical symptoms/signs similarly regressed/resolved over this 2-year interval.

Case reports of calcified thoracic disc herniations (TDH) spontaneously resolving

In two cases, large calcified thoracic disc herniations (TDH) responsible for significant myelopathy spontaneously resolved [Table 1].[14] In the first study by Oligane et al. (2018), a 40 year old female with significant cord compression experienced the spontaneous resolution of a large calcified TDH and myelopathy over an 8 month period.[6] In a second case report, Babashahi et al. (2019) presented an 8 year old female with significant myelopathy who originally presented with a large calcified T5-T6 thoracic disc herniation resulting in marked cord compression, and syrinx formation.[1] The original MR showed an intrinsic hyperintense cord signal extending from the T4/5-T9/10 levels. Spontaneously, six months later, without surgical intervention, the patient's myelopathy resolved as did the calcified disc complex; both intrinsic/intramedullary cord changes and the attendant syrinx regressed.

Regression of LDH with transforaminal lumbar epidural injections (TFESI)

In 2016, Hong et al. evaluated 28 patients with massive lumbar disc herniations seen on original MR studies; of interest, none had severe neurological deficits [Table 1].[3] Patients were uniformly treated with transforaminal lumbar epidural steroid injections (TFESI) that were performed over varying intervals (next 3-21 months): 59% of discs regressed on subsequent MR studies.

Veterinary observation of spontaneous LDH regression in a dog

Steffen et al. (2014) originally observed a large L3-L4 LDH on an MR performed in a 3 year old French bulldog who presented with a cauda equina syndrome [Table 1].[6] Interestingly, 5 weeks later, the subsequent MR showed the disc volume had spontaneously regressed by 69%, and the dog’s deficit similarly improved.

Resolution of C4-C5 cervical disc in this case

In this young patient (<30 years of age), the original cervical MR performed 9 months ago had demonstrated a significant central C4-C5 disc herniation with resultant spinal cord and bilateral nerve root compression. This case highlights the need to obtain updated/new MR studies within a reasonable interval, (e.g. within 3-4 months) following an original MR study. Up-dated MR examinations should then confirm whether there is a persistent significant cervical disc herniation warranting cervical surgical intervention.

CONCLUSION

Here, we report how a young patient (<30 years of age) showed, on successive MR studies (i.e., 9 months apart), complete resolution of a significant C4-C5 disc herniation, thus avoiding cervical surgery.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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