Does Incorrect Level Needle Localization During Anterior Cervical Discectomy and Fusion Lead to Accelerated Disc Degeneration?

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FROM ABSTRACT

Study Design:  Retrospective radiographic analysis.

Objective:  To retrospectively review a group of patients undergoing anterior cervical discectomy and fusion (ACDF) to determine the relative risk of adjacent level disc degeneration after incorrect needle localization.

Summary of Background Data:  The needle puncture technique is a well-established method to cause disc degeneration in experimental animal studies. The risk for accelerated degeneration because of needle puncture in humans is unknown.

Methods:  A retrospective radiographic analysis of 87 consecutive patients after single or 2-level ACDF with anterior plate instrumentation was performed. Perioperative and follow-up radiographs were used to grade disc degeneration according to a previously described scale.

Results:  Eighty-seven patients were included in the study (36 underwent 1-level ACDF, and 51 underwent 2-level ACDF). Seventy-two had correct needle localization at the level of planned surgery; 15 had incorrect needle localization (1 level above the operative level).

Patients in the incorrectly marked group were statistically more likely to demonstrate progressive disc degeneration with an odds ratio of [220% increased risk].

Conclusion:  There is a 3-fold increase in risk of developing adjacent level disc degeneration in incorrectly marked discs after ACDF at short-term follow-up.

This may indicate that either needle related trauma or unnecessary surgical dissection contributes to accelerated adjacent segment degeneration.

THESE AUTHORS ALSO NOTE:

“Anterior cervical discectomy and fusion (ACDF) is a commonly performed procedure for patients with axial neck pain and upper extremity radiculopathy.”

“Unfortunately, up to 25% of these patients will develop degenerative changes at adjacent levels within 10 years of surgery.”
Annular needle puncture models for studying the natural history of disc degeneration entails inserting a needle at the center of the disc through the annulus fibrosus and into the nucleus pulposus.

These authors questioned if a needle puncture could potentially lead to degenerative changes in an incorrectly marked disc level prior to fusion surgery.

DISCUSSION

This study shows that there is a high association between incorrect needle localization and adjacent segment degeneration.

In this study “there was a significant increase in degenerative changes in patients where needle puncture occurred in an adjacent level disc where incorrect level localization was performed.”

“Our results revealed 32% of patients developed radiographic evidence of disc degeneration even without needle puncture at a mean follow-up of 2 years after a single-level ACDF.”

The results of this study reveal a significant increase in the radiographic evidence of disc degeneration by 220% from incorrect level needle localization.

“Either unnecessary surgical dissection or needle related trauma at a nonfused level may contribute to accelerated adjacent segment degeneration.”

KEY POINTS FROM AUTHORS:

1) Needle puncture is a well-established method to cause disc degeneration in animal models. Needle puncture localization is commonly performed to localize the level of disc fusion in humans. Often, the needle is inserted into the incorrect level, a level that does not undergo fusion surgery.

2) “There is a 3-fold increase in risk of developing adjacent level disc degeneration in incorrectly marked [with needle insertion] discs.”

3) “Either unnecessary surgical dissection or needle related trauma might contribute to accelerated adjacent segment degeneration.”
KEY POINTS FROM DAN MURPHY:

1) “Anterior cervical discectomy and fusion (ACDF) is a commonly performed procedure for patients with axial neck pain and upper extremity radiculopathy.”

2) “Up to 25% of these patients will develop degenerative changes at adjacent levels within 10 years of surgery.”

3) Needle puncture is a well-established method to cause disc degeneration in animal models. Needle puncture localization is commonly performed to localize the level of disc fusion in humans. Often, the needle is inserted into the incorrect level, a level that does not undergo fusion surgery.

4) There is a 3-fold increase in risk of developing adjacent level disc degeneration in incorrectly marked discs after disc fusion at short-term follow-up.

5) In this study “there was a significant increase in degenerative changes in patients where needle puncture occurred in an adjacent level disc where incorrect level localization was performed.”

6) “Our results revealed 32% of patients developed radiographic evidence of disc degeneration even without needle puncture at a mean follow-up of 2 years after a single-level disc fusion.”

7) The results of this study reveal a significant increase in the radiographic evidence of disc degeneration by 220% from incorrect level needle localization.

8) “There is a 3-fold increase in risk of developing adjacent level disc degeneration in incorrectly marked [with needle insertion] discs.”

9) “Either unnecessary surgical dissection or needle related trauma might contribute to accelerated adjacent segment degeneration.”

COMMENTS FROM DAN MURPHY:

These statistics on acceleration of disc degeneration following a cervical spine disc fusion are important in the decision to undergo such a procedure.