

Epidural Steroid Injections and Risk of Lumbar Surgical Site Infection

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Myth: Epidural steroid injections (ESI) increase the risk of surgical site infection in patients undergoing any subsequent lumbar spine surgery.

Fact: The evidence addressing this statement is mixed and of insufficient quality to support a definitive relationship between pre-operative ESI and postoperative infection risk. While early evidence suggests that ESI may increase postoperative infection risk from instrumented spinal fusion, findings regarding non-instrumented lumbar surgery are more equivocal.

When performed according to guidelines, ESI is a low risk procedure used to treat radicular pain [1-3]. Given that steroids modulate the immune system and may impair wound healing [4,5], there is theoretical concern that an ESI in close temporal proximity to lumbar spinal surgery could increase the risk of surgical site infection.

The reported incidence of infection following lumbar microdiscectomy or decompression without instrumentation ranges from 0.6- 3.0% [6,7]. The incidence of infection is greater with instrumented fusions, ranging from 4.15- 18% [6-8]. The different types of surgery and technical approaches to each procedure carry variable risks. Specific surgery factors that influence the risk of infection include operative time, retractor placement, and uninterrupted sterile technique [9-11]. Non-procedure related factors known to contribute to the risk of infection associated with spinal surgery include advanced age, obesity, smoking, urgent surgery, poor control of diabetes mellitus, albumin level, and immunosuppression [9-13]. Therefore, it is challenging to determine whether a pre-operative ESI increases the risk of infection without a large enough cohort to support a multivariate regression analysis or other means of accounting for potentially confounding factors. Large prospective cohort studies of this type have not yet been published.

Lumbar Microdiscectomy

There is limited investigation related to infection risk associated with lumbar microdiscectomy. One retrospective case-control study (n=64) without risk-factor matching examined the correlation between preoperative transforaminal ESI and postoperative infection rate and identified no significant difference between groups [14]. However, no infections were reported in either group in this small study. Secondary findings included longer operative times and increased blood loss in the group that received a transforaminal ESI. Given the paucity of literature related to lumbar microdiscectomy, it is not possible to draw evidence-based conclusions regarding the risk of infection associated with a preceding lumbar ESI.

Lumbar Decompression Without Fusion

One study assessed the association infection risk in relation to an ESI prior to lumbar decompression without fusion in the Medicare population [15]. Patients were categorized into four cohorts based on the temporal relationship of an ESI to decompression. Postoperative infection was identified within 90 days of the index decompression. Confounding variables (e.g. diabetes, smoking status) and the reports of infection were identified only through the use of ICD-9 and CPT codes. Notably, there was no mention of surgical times, sterile practices, frequency of injections, control of diabetes, smoking status, or pre-operative nutritional status [13]. Patients who underwent an ESI within one month and within 1-3 months of surgery had a significantly increased

risk of infection [15]. Incidentally, the overall infection risks for all the ESI cohorts ranged from 0.8-1.7%, which falls within the generally accepted risk for lumbar surgery without fusion and well below the national average for surgical site infection rates. Recent studies have reached similar conclusions using similar study methods and data from the same source [16]. The rate of post-operative infection was again noted to be low (1.40- 1.98%) across the ESI cohorts, but a significantly higher odds ratio was noted in those that received an ESI within 1-3 months (OR 4.69) and within 3-6 months (OR 5.33) prior to surgery [16]. The paradoxical increase at 3-6 months is not explained. This finding may be related to confounding factors that were not accounted for in the study sample.

Alternatively, other studies have reported no association between lumbar ESI and an increased risk of postoperative infection [14,17,18]. A retrospective study of the military population included 847 patients who received an ESI and 5,688 control patients prior to single level decompression surgery [18]. The findings revealed no statistically significant difference in infection rates between groups within 90 days of surgery. Another retrospective study identified 945 patients who had received at least one ESI and 4,366 control patients who had undergone laminectomy or arthrodesis procedures [17]. Variables such as duration of surgery, pre-operative hemoglobin, and duration of hospital stay were recorded. There was no increase in the risk of postsurgical infection within 90 days in the ESI cohort compared to the control cohort. Longer hospital stay, greater intraoperative blood loss, posterior approach, and drain placement during surgery were associated with an increased risk of postoperative infection.

ESI within one month [OR 2.5 (2.0-3.3), $P < 0.0001$] and 1-3 months [OR 1.4 (1.2-1.7), $P < 0.002$] of fusion surgery [17]. There was no difference in postoperative infection risk in patients who had received an ESI more than 3 months prior to surgery [20].

Conclusion

The current evidence assessing the relationship between a preoperative ESI and spinal surgery is of insufficient quality to draw definitive conclusions. Early evidence suggests there may be an association between ESI and infection for instrumented spinal fusion, with more equivocal findings regarding non-instrumented lumbar surgery. For instrumented lumbar fusion, the risk may be greatest the closer ESI is to surgery. Certain comorbidities may increase the risk of surgical site infection following ESI, though it must be acknowledged that there is currently no published data that definitively supports this possibility. Additional cohort studies that account for risk factors associated with surgical site infections would be helpful.

Lumbar Decompression with Fusion

Two studies identify a correlation between ESI and the risk of post-operative infection after lumbar fusion. A 2015 retrospective cohort study (n=280) demonstrated an increased incidence of deep wound complications within 30 days of thoracic and/or lumbar fusion surgery if an ESI had been performed preoperatively (n=3) compared with no ESI (n=1), but this difference was not statistically significant ($p = 0.163$) [19]. The temporal relationship between the ESI and surgery was not reported. A 2017 study used a commercial insurance database to examine infection rates within three months of lumbar fusion. The overall infection rate was 1.6% and there was an increased risk of infection in patients who received an

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