

most importantly, the study's premise that a single intervention alone, regardless of how it was administered and in what context, would lead to decreased long-term opioid consumption is flawed. In the meta-analysis cited by the authors that examined the effects of regional anesthesia on chronic postsurgical pain,² that study's authors could find only a single prospective trial that reported positive results comparing epidural analgesia to placebo after abdominal surgery. That single study³ used preventive epidural analgesia in a multimodal regimen to decrease chronic postsurgical pain, while equivocal results were found in another that did not use multimodal analgesia.⁴ It is not surprising, then, that Ladha *et al.* found no benefit. They did not report on the presence or absence of multimodal analgesia, which would impact their results.

Second, virtually nothing is known about the details of the epidural placement, location, medication choice, and timing and duration of therapy. As de Leon-Casasola⁵ described over a decade ago, knowledge of these and other procedural details is critical in assessing the effectiveness of epidural analgesia for any postoperative outcome. Unfortunately, the authors used Current Procedural Terminology codes to identify patients who received epidurals, leaving the timing of epidural placement (pre-, intra-, or postoperative), as well as all other technical details, unclear. Preoperative initiation of epidural analgesia may be more effective than intraoperative initiation at preventing hyperalgesia,⁶ and the duration of the infusion likely plays a role as well,⁴ but combining all epidurals into one category would likely dilute any effect seen in any patient subset.

Finally, the use of a 30-day period free of opioid prescription fills after hospital discharge is an unusual endpoint and may not accurately reflect postsurgical pain and opioid use. Pain medication adherence is often poor in patients with chronic pain,⁷ so the use of filled opioid prescriptions as a marker of chronic pain is questionable at best.

It would have been more interesting to test the hypothesis that epidural analgesia decreases chronic pain when standardized and used in a multimodal protocol. Unfortunately, this may not be possible retrospectively.

Competing Interests

Dr. Viscusi has received consultancy fees from AcclRx (Redwood City, California), Medicines Company (Parsippany, New Jersey), Mallinckrodt (St. Louis, Missouri), Trevena (King of Prussia, Pennsylvania), Cara Pharmaceuticals (Shelton, Connecticut), and AstraZeneca (Wilmington, Delaware). He has received lecturing fees from AcclRx, Merck (Kenilworth, New Jersey), Salix (Raleigh, North Carolina), and Mallinckrodt. His institution has received grant money from AcclRx and Pacira (Parsippany, New Jersey). The other authors declare no competing interests.

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In Reply:

We would like to thank Schwenk *et al.* for their interest and comments related to our article.¹ However, we believe that the objections raised are misguided, given the hypothesis being tested and the methods employed in our study.

In their letter, the authors state that it is only in combination with other multimodal analgesics that epidural analgesia would decrease the risk of persistent opioid use. Because we did not capture whether multimodal anesthesia was used, they argue that the entire premise of our study was flawed. While it is perhaps an interesting hypothesis that epidurals only decrease persistent opioid use when used in conjunction with other modalities, it is pure speculation. It does not make our study, which tested the hypothesis that epidurals decrease persistent opioid use, “flawed.” Epidurals are likely often used in conjunction with other analgesics (such as acetaminophen or nonsteroidal antiinflammatory drugs²), and if this combination were to decrease the risk of persistent opioid use, then there should have been some signal of benefit for epidurals (which, unfortunately, there was not).

The authors go on to suggest that the reason we did not observe a benefit for epidurals in decreasing persistent opioid use was because we did not obtain details regarding epidural placement location, timing, duration, or medication used. Indeed, we did not capture these details in our dataset, and the exposure studied should be interpreted as epidural placement and management as it is routinely

performed in a large, nationwide sample of hospitals. While perhaps there is a particular “location” or “medication” that would result in epidural anesthesia decreasing persistent opioid use, this is again pure speculation on the part of the letter’s authors.

The last issue raised was that the outcome chosen was “unusual.” While the argument provided by the authors is difficult to follow, we would point out that there is no widely agreed upon definition of persistent opioid use. Our primary definition of lack of opioid filling for 30 days is a clinically reasonable definition for discontinuing opioids after surgery that can be operationalized in healthcare utilization data. We also included several sensitivity analyses where the outcome definition of discontinuation was varied to ensure that our results were robust—in none of these did epidural analgesia confer a protective effect against persistent use. Further, we would argue that the use of survival techniques to longitudinally analyze prescriptions represents a significant advancement in statistical methods when compared to the previous literature.

The authors state that our study is “flawed” and does not advance the understanding of the long-term benefits of epidural analgesia, but they have not offered a single cogent argument as to why this is the case. Our study benefited from a large sample size, careful study design, control for a very extensive list of confounders using state-of-the-art epidemiologic methods based in propensity scores, and multiple sensitivity analyses to test the robustness of our findings. There are certainly many benefits associated with epidural analgesia after abdominal surgery, but our data

show that prevention of persistent opioid use is not one of them.

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Competing Interests

The authors declare no competing interests.

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