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**The Effect of Epidural Anesthesia on Oncologic Outcomes
After Surgery for Colon and Rectal Cancer**

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Background: Surgical trauma induces a physiologic stress response that is well documented in the literature (Kehlet, 1999; Ordemann, 2001; Ozawa, 2000). The surgical stress response comprises alterations in the endocrine, metabolic, inflammatory and immune systems with important clinical ramifications on patient morbidity and recovery in the post-operative period. Consequences have been identified in multiple organ systems. Emphasis has therefore been placed on the identification of practices and techniques that may reduce the invasiveness of the surgical procedure and hence the resultant deleterious surgical stress response. Minimally invasive surgery, i.e. laparoscopy, is one innovation that has been shown to reduce postoperative immunosuppression when compared to conventional surgical approaches in colon surgery (Ordemann, 2001). In a similar manner, epidural anesthesia has been shown to have an impact on the stress response and post-operative morbidity. The neural blockade provided by epidural anesthesia has been demonstrated to reduce intra-operative blood loss, postoperative MI, wound infection, DVT and PE by as much as 30% to 50% (Scott, 1988; Kehlet, 1990; Rodgers, 2000). The relationship of the stress response to oncologic-specific outcomes has not been well defined in the literature. Attenuation of the tumor-promoting effect of surgery by spinal blockade has been studied in rats. Bar-Yosef et al (2001) utilized a rat model to study the impact of adjunctive spinal anesthesia on cancer metastases after laparotomy. The study reported a 70% reduction in the lung tumor retention (i.e., metastases) when spinal blockade was added to general anesthesia during laparotomy. The pursuit of clinical practices that reduce the stress response with resultant improvement in long-term oncologic outcomes has important potential clinical implications.

Objectives: This study sought to identify an association between the utilization of epidural anesthesia and analgesia with oncologic outcomes in surgery for colon and rectal cancer. Our study utilized mortality and cancer recurrence endpoints with the hopes that the identification of an association of improved cancer survival and outcomes with the use of epidural anesthesia and analgesia may target future studies with prospective research strategies.

Methods: A retrospective review of patients undergoing surgery for colon and rectal cancer at UMass and Memorial Hospitals between 1999 and 2001 was conducted. Patients were identified as adults, age ≥ 18 years, entered in the UMass Tumor Registry as undergoing conventional surgery for colon and rectal cancer. A chart review was conducted to determine the type and adequacy of anesthesia and analgesia during surgery and the post-operative course. Information was also collected regarding pre-existing patient comorbidities, surgeon, post-operative day of discharge, and in-hospital complications. Subjective criteria were established to determine adequacy of epidural and post-operative pain control. The use of an epidural was determined utilizing anesthesia, nursing and progress notes, and physician order documents. An epidural was determined to be adequate if: 1) the epidural was placed and dosed prior to the time of incision; 2) the epidural was maintained and utilized until post-operative day one at the minimum; 3) the patient did not report significant pain requiring adjunctive or alternative pain management; and 4) the epidural was not determined to be ineffective or malfunctioning during the time of its use. Overall adequacy of pain management was determined by patient-reported pain that was recorded in the patient record and that required or was addressed with the adjustment of either the dose or method of pain control. The data were collected on an Excel spread sheet and patients were assigned random identifiers for confidentiality purposes. Descriptive and bivariate analyses were conducted utilizing SPSS statistical software. A p-value of $<.05$ was utilized to identify relationships deemed to be statistically significant.

Results: A total of 362 patients undergoing colon and rectal cancer surgery were enrolled in the UMass Tumor registry between 1999 and 2001. Of those, 9 patients (2.5%) expired during their hospitalization and were not included in this analysis. Of the remaining charts, 102 charts (28.0%) were not studied due to unavailability of the patient record, lack of date of service on record, or because the surgery was conducted at an outside institution. Data was collected on 249 (69.0%) patients; of which 23 (9.2%) received epidural anesthesia and analgesia. The average patient age at the time of surgery was 69.7 years (range: 23-96 years), and patients were followed in the registry for an average of 19.1 months (range: 0-48 months). There were no statistically significant differences in the patients who received an epidural versus those who did not in regards to gender, age, cancer stage and pre-existing co-morbidities. Males were slightly more likely to receive an epidural at 13.0% versus 6.4% in female patients ($p=0.079$). Post-operative complications occurred, on average, in 46.6% of patients. In patients receiving epidurals, 60.9% had a postoperative complication, versus only 52.7% of patients who did not receive an epidural. However these differences were found to be statistically insignificant ($p=0.452$). Furthermore, there were no significant differences in the end-point variables of mortality and evidence of disease between patients who received an epidural and those who did not. Overall, mortality occurred in 23.3% of patients and evidence of disease was found in 22.0% of patients at the time of data collection. Patients who received an epidural did have a slightly increased length of hospital stay after operation, with an average postoperative day of discharge of 9.0 days versus 7.6 days (range 1 to 35 days) in patients without an epidural; although this difference was not statistically significant ($p=0.338$). Among the various forms of postoperative pain control, subjective interpretation found that 20.9% of patients had inadequate pain management. No adverse events were reported related to the use of epidural anesthesia.

Discussion: Our study was limited by a small patient population which may have underpowered any potential association between the use of epidural anesthesia and an improvement in oncologic outcomes. The time to follow-up was limited by the chosen time frame as well as the finding that the event, i.e., use of epidural anesthesia, became increasingly rare with more remote dates of operation. Due to the fact that the data was collected from a record review, it is also possible that several biases occurred due to the subjective nature of record interpretation. Furthermore, it is possible that several data points may have been underreported due to the accuracy of data collected from a record review as the data in question may not have been recorded in the chart, or was present, and may have been missed at the time of review. However, based on the source of our patient population, an urban, level 3 trauma and referral center, as well as the diversity of patient age, gender, comorbidity, and surgeon, the population is assumed to be appropriately representative and therefore generalizable within the treatment of adults with colon and rectal cancer. Although the event in question, the use of epidural anesthesia, is rare, this study nonetheless provides important descriptive data regarding the use of epidural anesthesia in certain patient populations as well as the possibility of inadequacies in post-operative pain management, regardless of modality.

Conclusions: Our study did not find any significant differences in the population of patients receiving epidural anesthesia at the time of operation for colon or rectal cancer in regards to age, cancer stage or pre-existing comorbidities. The data does suggest that male patients are slightly more likely to receive an epidural at our institution. No association was found between the use of epidural anesthesia and improved mortality or disease recurrence. Patients receiving an epidural did not have a significantly higher rate of post-operative complications. No adverse events occurred related to the use of epidural anesthesia. However, patients who received an epidural did stay in the hospital an average of 1.4 days longer. In the future, it would be beneficial to conduct a multi-center prospective cohort study to increase sample size, data collection, and to improve data accuracy due to the need for subjectivity in a retrospective record review. This study does serve to generate discussion and thought about a potential clinical practice that may not only improve patient pain management and reduce post-operative morbidities, but may also have the potential to improve long-term outcome and survival.

Ordemann, J., Surg Endosc. 15:600, 2001
Ozawa, A., Surg Today 30:107, 2000
Scott, NB., Br J Surg. 75:299, 1988
Kehlet, H., Curr Pract Surg, 2:223, 1990
Bar-Yosef, Anesthesiology 94:1066, 2001