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POSTOPERATIVE INFECTION RATES WITH INSTRUMENTED LUMBAR FUSION: A RETROSPECTIVE REVIEW OF 129 CONSECUTIVE CASES

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Running Title: Infection with Spinal Instrumentation

ABSTRACT

Introduction: The use of internal fixation devices in spinal surgery is common to achieve reduction, maintain alignment, and stabilize the spine while fusion occurs. Infection rates of less than 2% (0-2%) were reported in the late 1960's without the use of instrumentation. Reported rates of infection following instrumented fusion are generally around 6% (range 0-11%). The purpose of this study was to retrospectively review the incidence of postoperative infection following instrumented spinal fusion to determine if infection rates related to patient type and surgical procedure.

Methods: A retrospective review was conducted of 129 consecutive cases of instrumented lumbar spinal fusion. Three patients were eliminated from the study: two due to preoperative spinal infections, and a third patient expired from unrelated disease. All instrumented fusion cases were eligible for this study regardless of level or technique used.

Results: Of the 126 instrumented cases there were no superficial infections, and one (0.8%) deep infection. The infection was completely resolved and did not prevent solid fusion with good alignment. The patient was a smoker and received autograft bone.

Discussion: The results of this review revealed substantially lower rates of postoperative infection following instrumented fusion than has been previously reported in the literature. No superficial and one (0.8%) deep infection was identified. Due to the low infection rates, no statistically significant conclusions could be made.

INTRODUCTION

One of the goals of an orthopedic surgeon is to prevent spinal infections during instrumented lumbar fusion operations. If an infection does occur, there can be numerous consequences including pain, costly hospital treatments, implant removal, and even death (2, 15). The percentage of postoperative spinal infections has increased over the past two decades. In the 1960s, the infection rate was around 2% while the rate today is generally around 6% and higher (Table 1) (9, 11, 15).

The large increase of infections is due to the current usage of instrumentation such as screws, rods, and plates, which were not used prior to the 1960s. Instrumented surgeries are more complicated than those that are non-instrumented and thus require longer operating times. Since inoculation of the wound is most likely to occur during surgery, the longer surgery times often lead to higher infection rates. Particularly, surgeries over 5 hours have an increase in infection rates. Other perioperative factors that lead to high infection rates include prolonged retraction, excessive traffic in the operating room, trauma center operating rooms, and bone grafts (5, 9, 15).

There are also several preoperative conditions that are known to increase an individual's risk of acquiring an infection. These conditions include advanced age, prolonged bed rest, chronic malnutrition, obesity, smoking, poorly controlled diabetes, immunosupression, and infection at remote sites (5, 9, 15).

The objective of this study was to determine the postoperative infection rate following instrumented spinal surgery as related to patient type and surgical procedure at the Chattanooga Orthopaedic Group.

METHODS

Patients

A retrospective review of 129 consecutive instrumented lumbar fusion surgeries from July 1996 to August 1997 was conducted. Indications for surgery, levels of instrumentation, and

surgical technique varied among the patients and had no effect on eligibility for the study. Both single and multiple level instrumentations were performed. The different instrumentation systems were comprised of pedicle screws, cages, plates, hooks and rods. Three patients were excluded from the study: two patients were withdrawn due to preoperative spinal infections, and the third perished from an unrelated disease.

Records & Categories Examined

Preoperative office records including history and physical records along with patient completed forms were examined. Factors that could influence the patients susceptibility to infection were recorded: age at the time of surgery, sex, IV drug use, smoking and drinking habits, any form of diabetes mellitus, turberculosis, and immunosuppression. Obesity was determined according to the body mass index and the result recorded.

For intraoperative information, operative notes were surveyed. The surgeon, date of surgery, approach, form of instrumentation, type of bone graft, and estimated blood loss were recorded. The incision to closure time of the wound was calculated from operating room notes.

The postoperative condition of the patient was determined from patient's discharge notes, physician's follow-up notes, and lab results. All infections were noted along with the causative organism, treatment, and if the infection had been resolved.

Prophylaxis & Sterility Techniques

Preoperative and operative procedures to prevent infection were strictly followed. All patients were given 1 gram each of Cefazolin and Gentamicin 30 minutes preoperatively unless allergies prohibited administration. If allergies existed, 500 mg of Vancomycin was administered alternatively. When the operative time was extensive, Gentamicin was dispensed every four hours during the surgical procedure. The antibiotics were continued for 48 hours postoperatively.

In preparation for the surgery, all patients underwent a 5 minute Betadine scrub and were double draped with Betadine Viadrape. To insure sterility, all instruments were prepared by decontamination, hand washing, machine washing, and steam sterilization for 30 minutes.

In addition, all operating room personal were familiar with the procedures allowing minimal conversation, traffic, and passing of instruments to occur. Thin retractors were used to minimize tissue necrosis.

RESULTS

The average age of patients at the time of surgery was 46.6 years (range 10-75 years) with 69 (54.8%) of the patients females and 57 (45.2%) males. Medical history provided by the patients gave the following demographics: 49 (39%) cigarette smokers, 32 (25%) obese, 30 (24%) mild to moderate drinkers, 4 (3%) diabetics, and 3 (2%) immunosuppressed.

All patients received bone graft. One hundred and fourteen patients received autograft, 9 allograft, and 3 both auto- and allograft. The average blood loss was 704 mL (range 49-6000 mL) and the average operative time was 211.7 minutes (range 46-683 minutes).

No superficial infections and 1 (0.8%) deep infection were found. When identified postoperatively, the organism of the deep infection was identified as *Staphylococcus aureus* and treated with irrigation and debridement, dressing changes, and six weeks of IV antibiotics. Eleven days after the surgery, the patient had received a myelogram. Then eleven days after the myelogram, the infection was found at the wound site.

It was concluded that the infection followed the path of the myelogram needle. This suggested either a deep infection traveled the needle path outward to the incision or the needle caused the infection to travel down to the deep site. The patient smoked, received an autograft, had a blood loss of 450 mL, and an operative time of 180 minutes. The infection was completely resolved and did not prevent solid fusion and good alignment to occur.

DISCUSSION

The spinal infection rate has increased dramatically since the utilization of instrumentation. Infections often cause pain and in some cases even cause death; therefore, it is

trauma center or university medical center. Community hospitals are less likely to have patients bringing in infections and the hospital staff has more time in-between patients to prepare the operating room.

The results of this study have a substantially lower rate of infection than the generally accepted 6%. The reason for the lower rate cannot be concluded due to the many variables involved and lack of information from other studies. Possible reasons include thin retractor use, low operative times with little traffic in the operating room, and procedures preformed in a community hospital. To know the exact cause(s) for the lower rate can only be decided by additional studies with more control of the variables.

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