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Discitis Following Microdiskectomy: A Preliminary Report on the Role of Pre-Operative Prophylactic Antibiotics

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Southern Scholars of Southern Adventist University

by

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cefazolin, discitis, microdiskectomy, prophylactic antibiotics, results, vancomycin

Dear Reviewers:

This paper was written over the course of the summer of 1996, during which time I was serving a fellowship position as research assistant at the Chattanooga Orthopaedic Group under the direct supervision of Dr. Scott Hodges, spinal surgeon.

This paper has been presented five times, twice by Dr. Hodges and three times by myself. I presented this paper in the fall semester of 1996 to the Intro to Research biology class at Southern Adventist University. In the spring semester of 1998, I presented the paper a second time at S.A.U. to the Biology Seminar class, a required research class for senior biology majors. And the third time I presented the paper was in April of 1998 for the Tennessee Academy of Science Collegiate Division Meetings, which that year were held at Southern Adventist University. This project was accepted as a poster and presented by Dr. Hodges at the following two orthopaedic conventions: the 14th annual meeting of the Southern Orthopaedic Association, Pebble Beach, California, July 24-6, 1997; and also at the Annual Clinical Assembly of Osteopathic Specialists, Atlanta, Georgia, September 20-3, 1997.

A full manuscript of this paper is enclosed, including an abstract outlining study design, goals, methods, results, and conclusions.

Sincerely,

Stacey J. McClarty

ABSTRACT

Study Design: 83 consecutive microdiskectomies were performed and evaluated to discern the efficacy of pre-operative prophylactic antibiotics (cefazolin and vancomycin).

Objective: The objective of this preliminary report was to evaluate the amount, time of administration, effectiveness, and need of prophylactic antibiotics using our surgical results.

Summary of Background Data: Previous studies have yielded conflicting results regarding the role of antibiotics in prevention and treatment of discitis , and in their ability to penetrate the intervertebral disc.

Methods: 1gm of cefazolin was intravenously administered to 76 patients, 30 minutes prior to incision; 500mg of vancomycin was likewise administered to the remaining 7 patients who were allergic to cephalosporins. No post-operative antibiotic was administered.

Results: Of the 83 consecutive surgeries, no patient developed iatrogenic discitis. The average length of follow-up was 6 months (range 1 - 23 months).

Conclusions: Our results suggest that the use of cephalosporins (and glycopeptides) seems to prevent discitis when intravenously administered 30 minutes prior to surgery; that being the case, there appears to be no advantage in additional post-operative dosing. However, in light of conflicting reports and the preliminary nature of this study, conceivably there is another explanation. Perhaps there is in fact no correlation between pre-operative antibiotics and post-operative discitis.

INTRODUCTION

Lumbar discitis following microdiskectomy is an infrequent and incompletely understood complication. When it does occur, it is costly and debilitating (3,12,18). Following disc excision, incidence rates of discitis vary from 0.75% to 3% (12,15,16). Ford and Key first described infection of the intervertebral disc space after lumbar discectomy in 1955 (6); reports since then have most often identified the infectious organism of *Staphylococcus aureus* (5,11,12).

Numerous publications support the use of prophylactic antibiotics (1,8,9,10,13,19), but few definitive studies exist, particularly concerning microdiskectomy. Therefore, the aim of this preliminary report was to give an idea whether or not pre-operative prophylactic antibiotics were effective. Based on the available literature, parameters were chosen that were delivered most likely to succeed in the prevention of iatrogenic discitis.

MATERIALS AND METHODS

Inclusion Criteria:

Between August 1994 and May 1996, 84 consecutive microdiskectomies were performed by the senior author (SDH) to produce this retrospective review. One patient had been previously admitted to the hospital and was under antibiotic administration leading up to surgery. She was excluded from the study because she was neither administered cefazolin nor vancomycin, thus becoming inapplicable to this review; however, after a 3-month evaluation, she had not developed discitis. No other patient was excluded from the study group based on medical history, worker's compensation, age, or other stipulation.

Surgical Procedures:

Coinciding with the reports of Osti et al (14), 1gm of Ancef (cefazolin) was intravenously administered to 76 (92%) patients, 30 minutes prior to incision; the remaining 7 (8%) patients were allergic to cephalosporins and instead were given 500mg of vancomycin, administered in likewise fashion. A routine microdiskectomy was performed in all cases, and no post-operative antibiotic was given. General information regarding these 83 surgeries is presented in Table 1.

RESULTS

MRI Analysis:

From the 83 surgeries, there were no clinical developments of discitis. An MRI was taken of any patient who had persistent back pain, an increased temperature, or an elevated erythrocyte rate (ESR); a review of the MRI results revealed no diagnoses of discitis.

Patient Follow-Up:

Discitis usually appears 4-5 weeks after surgery (3,7,12); therefore, following discharge, all patients were evaluated at 2-week, 6-week, and 3-month intervals (as necessary). Two patients had their final evaluation at 4-weeks; they were told to follow-up as necessary. Neither patient had further medical complications and needed no further follow-up. The average length of follow-up after surgery was 6 months (range 4 weeks - 23 months).

High Risk Patients:

Prior to surgery, there were three high risk patients; these patients were classified high risk due to treatment with steroidal medications (such as Prednisone) for maladies of diabetes, rheumatoid arthritis, and asthma. All of these patients tolerated both the antibiotic administration and the microdiskectomy procedure well, developing no post-operative signs or symptoms of discitis.

DISCUSSION

Intravenous antibiotics are routinely administered before lumbar surgery as a prophylaxis agent infection (discitis) during the operation (1). There is controversy, however, regarding the role of antibiotics in prevention and treatment of discitis, and in their ability to penetrate the intervertebral disc. Since the human intervertebral disc spaces are avascular after age 20, antibiotics must enter discs by way of passive diffusion (2,4). Consequently, there are conflicting reports as to when, or if, the antibiotic should be administered. Reports by Boscardin et al (1) and Guiboux et al (8) support the use of preoperative antibiotics (cefazolin, vancomycin) given approximately 1 hour before entering the disc because of peak disc concentration of antibiotic at that time. However, differing reports by Eismont et al (4) and Scuderi et al (17) could not demonstrate cephalosporin penetration into the nucleus pulposus in their experiments with rabbits; Scuderi also reported the highest concentration level of vancomycin occurred in the nucleus pulposus at 8 hours after initial injection.

Fraser et al (7) used a sheep model for his two-part study of iatrogenic discitis. Cefazolin was detectable within the disc space 30 minutes after inoculation. Also, no discitis was noted in sheep that were protected by intravenous cefazolin administration 30 minutes before injection of bacteria, whereas discitis developed in all of the unprotected sheep. This report supports our findings in that our results suggest the use of cephalosporins (and glycopeptides) seems to prevent discitis when intravenously administered 30 minutes prior to surgery.

Since pre-operative prophylactic antibiotics alone seem to have prevented discitis, we feel that there is no advantage in administering additional post-operative antibiotics. Fraser et al (7) and Guiboux et al (8) agree that there seems to be no clear benefit of post-operative dosing, Fraser et al stating that repeated intradiscal injections of antibiotic as a means of delivering a therapeutic level of antibiotic to the disc space would not seem to be a practical method of treatment.

In light of the lack of controls and the preliminary nature of our study, these results should be viewed with caution. Since we had no cases of discitis in 83 consecutive microdiskectomies, one conclusion could be that the prophylactic antibiotics prevented the development of iatrogenic discitis. However, Eismont et al (4) and Scuderi et al (17) reported no antibiotic penetration of the nucleus pulposus. Given these conflicting reports plus the low incidence rate of discitis in general, an alternative conclusion could be that there is no correlation between pre-operative prophylactic antibiotics and post-operative bacterial infection. Obviously, additional randomized prospective studies must be performed before and firm conclusions can be reached.

CONCLUSIONS

In conclusion, when prophylactic antibiotics (1gm cefazolin or 500mg vancomycin) were intravenously administered 30 minutes prior to surgery in 83 consecutive microdiskectomies, there was no discitis; hence, this procedure looks to be an effective method in the prevention of iatrogenic discitis and there appears to be no need for post-operative antibiotics. However, whether pre-operative antibiotics are completely necessary is yet to be answered. We are currently working on a randomized prospective study which we feel is necessary to determine the actual need of pre- and post-operative prophylactic antibiotics.

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Statistics on 83 Microdiskectomy Surgeries

	Number (%)	Average (range)
Patient Age (at time of surgery):		43 (22-76)
Sex:		
Male	45 (54%)	
Female	38 (46%)	
Side of Microdiskectomy:		
Left	52 (53%)	
Right	31 (37%)	
Level of Microdiskectomy:		
L4-5	28 (34%)	
L5-S1	52 (62.5%)	
other (L3-S1, L4-S1, L3-5)	3 (3.5%)	
Estimated Blood Loss (in ccs):		45 (5-100)
Antibiotics Used:		
Ancef 1gm	76 (92%)	
Vancomycin 500mg	7 (8%)	
Smoker:		
Yes	31 (37%)	
No	52 (63%)	

Table 1