

ORIGINAL ARTICLE

# Frequency of Wound Infection after Single Level Anterior Cervical Discectomy without Bone Grafting

**ZAHID KHAN, MUMTAZ ALI, SEEMA SHARAFAT***Khalid Khanzada, Ikram Alam, Raza Aman, Khalid Mehmood Khan, Bilal Afridi  
Department of Neurosurgery, Lady Reading Hospital, Peshawar – Pakistan*

## ABSTRACT

**Objective:** To determine the frequency of wound infection after anterior cervical discectomy without bone grafting in patients with single level degenerative cervical disc herniation diagnosed on magnetic resonance imaging.

**Material and Methods:** This observational study was conducted at the department of Neurosurgery, Post-graduate medical institute, Lady Reading Hospital Peshawar from April 2009 March 2010. Sixty five (65) consecutive patients who undergone single level anterior cervical discectomy without bone grafting for degenerative cervical disc herniation were included in the study irrespective of their age and gender. The patients were observed for post-operative wound infection including superficial wound infection and discitis recorded.

**Results:** Out of 65 cases, 64.4% were males and 35.4% females. Majority 27.7% cases were in the age range of 41 – 50 years, 24.6% in the age group of 31 – 40 years and 18.5% in the age range of 21 – 30 years. We also had patients in other age groups. Majority of women, 30.8% of the total, were house wives, followed by (27.7%) those having sedentary life style as teachers, students and bankers. Mean duration of the symptoms was 5.53 months and mean duration of hospital stay was 6.95 days. Postoperative superficial wound infection was in 3.1% cases and discitis in 1.5% patients.

**Conclusions:** Age group of 41 – 50 years affected more than other age groups. Cervical disc herniation was common in men. Postoperative superficial wound infection was observed in 3.1% patients and discitis in 1.5% cases. Age group of 41 – 50 years affected more than other age groups. Cervical disc herniation was common in men. Postoperative superficial wound infection was observed in 3.1% patients and discitis in 1.5% cases. From the results of this study it is concluded that Cervical disc herniation is more common in male and the common age group affected is 41 – 50 years. Postoperative superficial wound infection was noted in 3.1% cases and Post-operative discitis was observed in 1.5% cases. Postoperative wound infection was common in males than females and was evident within 6 weeks of surgery.

**Key Words:** Cervical disc herniation; degenerative disease of cervical spine, MRI cervical spine, anterior cervical discectomy.

## INTRODUCTION

Anterior cervical discectomy is the most commonly adopted surgical procedure for the management of cervical inter-vertebral disc herniation.<sup>1</sup> Degenerative disc herniation is more common in lower cervical spine, in middle to old age men as compared to women.<sup>2-4</sup> Magnetic resonance imaging of the cervical spine is the investigation of choice for detecting the herniated discs and its sequelae.<sup>5</sup> Mainly anterior cervical dis-

cectomy is indicated for severe intractable pain and progressive neurological deficit.<sup>6</sup> Though some surgeons favor the insertion of bone graft or some artificial prosthesis, anterior cervical discectomy without bone grafting has been advocated by most since its introduction by Hirsch in 1960.<sup>7</sup> The insertion of bone graft, plating and prosthesis raises the cost and complications of the procedure but their long term efficacy has never been proved.<sup>7</sup>

Because of complex anatomy and delicacy of the structures around the cervical spine a number of perioperative complications are expected. These complications are cord injury (3.3%), wound infection (2%), hematoma formation (1.3%), recurrent laryngeal nerve injury, Horner's syndrome and respiratory insufficiency (1.1%), nerve root injury (0.4%), carotid or vertebral vessels injury (0.3%), tracheal and esophageal injury (0.2%), dural tear and cerebrospinal fluid leak and others.<sup>8-14</sup>

Wound infections after anterior cervical discectomy is comparatively rare and responds most of the time to conservative treatment, however sometimes this complication may be devastating and needs additional surgery.<sup>15</sup> The best strategy is prevention of wound infection at the time of surgery by adopting safe surgical technique and vigilant postoperative wound care.

Because of limited available local research work, this study of wound infection after anterior cervical discectomy without bone grafting will help us to prevent, minimize and promptly manage the complications of wound infection and discitis in our patients.

## MATERIAL AND METHODS

This observational study was conducted at the Department of Neurosurgery, Postgraduate Medical Institute, Lady Reading Hospital, Peshawar from April 2009 to May 2010. We included patients of both genders who undergone single level anterior cervical discectomy without bone grafting for degenerative disc herniation and excluded patients who had traumatic disc herniation, multiple level degenerative disc herniation, recurrent disc herniation and/or discectomy with bone grafting. After getting approval from the hospital ethical committee to conduct the study and taking informed consent, the medical record of patients who underwent simple anterior cervical discectomy was evaluated. The patients were observed for wound infection (superficial wound infection and discitis) for a period of 8 weeks after surgery. The criteria for diagnosis of superficial wound infection was sero-purulent discharge from the wound and that for postoperative discitis was raised ESR. The frequency of wound infection was calculated among the total cases operated with anterior cervical discectomy without bone graft.

### Proforma

All information was entered into a **proforma** especially designed for this purpose. The data was analyzed

by statistical program SPSS version 11.

## RESULTS

### Sex Incidence

We had total of 65 patients out of which 42 (64.6%) were men and 23 (35.4%) women with male to female ratio of 1.83:1.

**Table 1:** Sex Incidence.

Sex	No.	Percentage
Male	42	64%
Female	23	35.4%
Total	65	100%

### Age Incidence

The age of patients ranged from 16 to 70 years. The mean age was  $40.69 \pm 13.25$  years. Majority of patients 18 (27.7%) were in the age range of 41 – 50 years, followed by 16 (24.6%) patients in age group of 31 – 40 years (Table 2).

**Table 2:** Age – Wise Distribution of Patients (n = 65).

Age Ranges (in Years)	No. of Cases	Percentage
11 – 20 years	06	9.2%
21 – 30 years	12	18.5%
31 – 40 years	16	24.6%
41 – 50 years	18	27.7%
51 – 60 years	10	15.4%
61 – 70 years	03	4.6%

**Table 3:** Occupation of patients (n = 65).

Occupations	No. of Patients	Percentage
House wife	20	30.8%
Sedentary life style	18	27.7%
Laborers	12	18.5%
Farmers	10	15.4%
Other hard manual workers	05	7.7%

**Occupation of Patients**

The majority of women 20 (30.8%) patients were house – wives. While among men majority 18 (27.7%) comprised of those having sedentary life style (bankers, teachers, students) with comparatively less physical activities (Table 3).

**Table 4:** Geographical Distribution of the patients (n = 65).

Area	No. of Patients	Percentage
Northern areas	27	41.5%
Central areas	19	29.2%
FATA / Afghanistan	11	16.9%
Southern areas	08	12.3%

**Geographical Distribution**

Geographically the patients were divided in to 4 main groups as 1) Northern areas (Bunir, Mengoura, Swat), 2) Central areas (Peshawar, Charsadda, Mardan), 3) FATA (Federal administered tribal areas) and Southern areas (Karak, Kohat, Dera Ismail khan) as given in Table 4.

**Postoperative Wound Infection**

Post-operative superficial wound infection was noted in 02 (3.1%) cases and Post-operative discitis was observed in 01 (1.5%) patient. The overall wound infection rate after anterior cervical discectomy without bone grafting was 4.6% (3 patients), two of them were male and one female. 1<sup>st</sup> use man was 70 years old who had superficial wound infection (after 7 days of surgery), 2<sup>nd</sup> use other 58 years old with post-operative discitis (after 4 weeks). Third use female was 55 years old and had superficial wound infection after 9 days of surgery.

**DISCUSSION**

During the last three decades, the anterior approach to the cervical spine has been increasingly preferred in the operative treatment of herniated cervical disc because this approach has low morbidity, is cosmetically acceptable and provides direct access to the areas of most pathology.<sup>16</sup> An anterior approach allows direct decompression of nerve root and spinal cord. Discectomy with bone grafting is the most commonly adopted surgical procedure for cervical disc herniated up

till now but this is associated with the problems of graft displacement, graft failure and donor site complications as bleeding, pain and infection, while anterior cervical discectomy without bone grafting have no such problems as related to the graft and the long term results are almost the same in both the procedures.<sup>17-19</sup>

Postoperative wound infections after spine surgery have been reviewed in terms of occurrence rate, complications, microbiology and surgical technique. This complication is rare but may be devastating. It may require long term intravenous antibiotics, prolonged hospital stay and sometimes revision of the surgical procedure.<sup>20</sup>

In our study men were more common than women who had cervical disc herniation. There were 42 (64.4%) men and 23 (35.4%) women in this study. This may be because of the fact that we have male dominant society. Our men have to do heavy manual work to fulfill the needs of their daily lives. They bring heavy weights on their heads and so prone themselves to early degenerative changes of the cervical spine.<sup>21</sup> Chatley A and colleagues<sup>17</sup> also reported that disc herniation was more common in men. In another study the male and female ratio of having cervical disc herniation is 1.2:1. So these results are identical to that of our study.

In contrast to these results, in United State cervical disc herniation is more common in female than males.<sup>23</sup> Wright IP and Eisenstein SM<sup>24</sup> in their study conducted in United Kingdom also reported that cervical disc herniation is more common in females. The difference in life style and habit of smoking in females may be the reason that cervical disc herniation is more common in female in developed countries.

According to Kaye H<sup>25</sup> the mechanical influence on the cervical intervertebral discs by the extensive movement carried out in the cervical spine in relation to the rigid thoracic spine results in more loading per square centimeter by the head on the cervical discs which make it prone to degenerative changes. In a study involving Ghanaians, it is reported that out of 225 patients who carried loads on their head, 143 (63.6%) had cervical spondylosis, and of the 80 people who did not carry load on their head, 29 (36%) had cervical spondylosis.<sup>21</sup> This could be the reason that we had more patients (41.5%) from northern areas of the province, because people living in these areas bring water and wood from far long areas on their heads.

Cervical disc herniation is more common in people during 3rd, 4th and 5th decades of life. This may be because of more degenerative changes of spine in

these age groups.<sup>23,26</sup> In our study there were 24.6% patients in the 4th and 27.7% in the 5th decade of life. So, most of our patients (52.3%) were in these two decades. Mean age of our patients was 40.69 years. In one of the studies, of cervical disc herniation, mean age of the patients was 36 (range 24 – 76 years).<sup>27</sup>

Lee JY and colleagues<sup>28</sup> studied 13 cases with radiculopathy due to cervical disc prolapse with mean age of patients 49 years. In other studies mean age of the patients was 52.29 and 53.122 years. We have comparatively young patients affected. This difference may be because of fact that our people are less health conscious and secondly the cause for radiculopathy in other studies was cervical stenosis in addition to disc herniation but we included only patients who had cervical disc herniation. Stenosis affects later age group than disc herniation.

Postoperative spine infection is infrequent due to rich blood supply of the vertebrae and prophylactic use of antibiotic. Reconstructive and lengthy procedures with the use of hardware during spinal instrumentation exhibit a higher risk of infection. The usual pathogenic organism of postoperative spondylodiscitis is staph aureus and is assumed to be the result of direct inoculation of the offending pathogen during surgery and / or dissemination from other infection sites.

We had two (3.1%) patients who developed superficial wound infection and one (1.5%) postoperative discitis. The overall infection rate in our study was 4.6%. The results vary in different studies. In a comparative study, Chang FY and colleagues<sup>30</sup> studied 124 patients who undergone spinal surgery and Six patients (4.8%) developed postoperative wound infection. In their study of 1629 patients with spinal procedures Fung and colleagues<sup>31</sup> reported that postoperative wound infection rate was 4.4%. These results are almost identical to our study.

Fountas KN and colleagues<sup>32</sup> reported overall superficial wound infection rate of 0.1% in their study of 1015 patients who underwent anterior cervical discectomy. In another study the reported disc space infection rate is 0.5% after anterior cervical discectomy.<sup>33</sup> The infection rate was lower than our study. The reason may be because this study was conducted in United States and the overall infection rate is lower in developed countries. The difference between sample sizes may be another explanation for this.

Metal implants, used during anterior cervical discectomy, may work as nidus for the growth of microorganisms. Infections following spinal fusion with instrumentation have been reported to occur in 2.6% to

10% of patients.<sup>34-35</sup> This infection rate may reach 33.3%.<sup>36</sup> Cervical discitis may follow after other surgical procedures on the cervical spine as anterior cervical foramenotomy (4.8%),<sup>37</sup> minimal invasive endoscopic discectomy (1.9%)<sup>38</sup> and cervical discography (2.4%).<sup>39</sup> This is higher than what we observed (1.5%) in our study.

Out of the 3 patients with postoperative wound infection in our study, two were male and one female with male to female ratio of 2:1. The female was 55 years old and the men were 58 (discitis) and 70 years respectively. Their average age was 61 years. Other studies also reported that wound infection after anterior cervical discectomy is more common in male, with the male – to – female ratios ranging from 2:1 to as high as 5:1.33 the exact reason for more common infection in women is not clear. But may be because hormonal difference, poor nutrition and poor hygiene.

Most of the times, infections occur during 1st 3 months of surgery.<sup>31</sup> Doufer V and others<sup>40</sup> reported 7 cases of postoperative discitis with duration of symptoms 16 weeks. Butler JS and colleagues<sup>41</sup> also reported in their study of 48 patients with postoperative wound infection with duration of symptoms 2 – 6 weeks. We had almost the same results and our complications also occurred within 6 weeks after surgery.

The rate of infections is high in the presence of risk factors like increase age, diabetes, smoking, steroid use, previous surgery, alcohol abuse, immune deficiency in case of malignancy, morbid obesity and radiation before surgery. Other risk factors are staging of the procedures, estimated blood loss, operative time and use of allograft or instrumentation.<sup>26</sup> The chances of infection in patients undergoing spinal surgery can be decreased by controlling these risk factors, taking aseptic measures and giving intravenous antibiotic at induction.<sup>31</sup>

Our patients with superficial wound infections were treated conservatively with antibiotics. They responded well. The patient who had cervical discitis was reoperated and debridement and bone grafting was done without metal implant used. Surgical exploration is not treatment for all patients with postoperative discitis or wound infection.<sup>40,41</sup> Surgical intervention may be necessary if infection is refractory to conservative treatment, to address any neurological deficits with decompression or stabilize the spine.<sup>42,43</sup>

## CONCLUSIONS

Age group of 41 – 50 years affected more than other

age groups. Cervical disc herniation was common in men. Postoperative superficial wound infection was observed in 3.1% patients and discitis in 1.5% cases. From the results of this study it is concluded that Cervical disc herniation is more common in male and the common age group affected is 41 – 50 years. Postoperative superficial wound infection was noted in 3.1% cases and Postoperative discitis was observed in 1.5% cases. Postoperative wound infection was common in males than females and was evident within 6 weeks of surgery.

*Address for Correspondence:*

*Dr. Zahid Khan*

*Department of Neurosurgery*

*Lady Reading Hospital, Peshawar – Pakistan*

*E-mail: seemasharafat@yahoo.com*

*Cell: 03339195630*

## REFERENCES

1. Oktenoglu T, Cosar M, Ozer AF, Iplikcioglu C, Sasani M, Canbulat N, et al. Anterior cervical microdiscectomy with or without fusion. *J Spinal Disord Tech* 2007; 20: 361-8.
2. van Jon Bergen HP, Spruit M, Anderson PG, Pavlov PW. Anterior cervical interbody fusion with a titanium box cage: early radiological assessment of fusion and subsidence. *Spine J* 2005; 5: 645-9.
3. Schrder J, Grosse – Dresselhaus F, Schul C, Wassmann H. Anterior cervical spinal fusion with the Intromed ZWE System: preliminary experience. *Neurosurg Rev* 2007; 30: 63-8.
4. Fraser JF, Hurlt R. Anterior approaches to fusion of the cervical spine: a metaanalysis of fusion rates. *J Neurosurg Spine* 2007; 6: 298-303.
5. Shams S, Rashid MJ. Anterior cervical reconstruction using titanium mesh cages. *J Ayub Med Coll* 2007; 19: 23-5.
6. Smith PN, Knaub MA, Kang JD. Anterior cervical approaches for cervical radiculopathy and myelopathy. *Instr Course Lect* 2003; 52: 455-63.
7. Bartels RHMA, Donk R, Wilt GJVD, Grotenhuis JA, Venderink D. Design of the PROCON trial: a prospective, randomized multi – center study comparing cervical anterior discectomy without fusion, with fusion or with arthroplasty. *BMC Musculoskelet Disord* 2006; 7: 85.
8. Shen FH, Samartzis D, Khanna N, Goldberg EJ, An HS. Comparison of clinical and radiographic outcome in instrumented anterior cervical discectomy and fusion with or without direct un-covertebral joint decompression. *Spine J* 2004; 4: 629-35.
9. Oslen MA, Nepple JJ, Riew KD, Lenke LG, Bridwell KH, Mayfield J, et al. Risk factors for surgical site infection following orthopaedic spinal operations. *J Bone Joint Surg Am* 2008; 90: 62-9.
10. Kilburg C, Sullivan HG, Mathiason MA. Effect of approach side during anterior cervical discectomy and fusion on the incidence of recurrent laryngeal nerve injury. *J Neurosurg Spine* 2006; 4: 273-7.
11. Khan I, Haider N, Nawaz H, Gun P, Choksey M. Titanium miniplates use: A simple and effective method of preventing bone graft dislodgment in anterior cervical discectomy and fusion. *J Postgrad Med Inst* 2005; 19: 339-40.
12. Shields LB, Raque GH, Glassman SD, Campbell M, Vitaz T, Harpring J, et al. Adverse effects associated with high – dose recombinant human bone morphogenetic protein – 2 use in anterior cervical spine fusion. *Spine* 2006; 31: 542-7.
13. Cho DY, Lee WY, Sheu PC, Chen CC. Cage containing a biphasic calcium phosphate ceramic (Triosite) for the treatment of cervical spondylosis. *Surg Neurol* 2005; 63: 497-503.
14. Spennato P, Rapanà A, Sannino E, Iaccarino C, Tedeschi E, Massarelli I, et al. Retropharyngeal cerebrospinal fluid collection as a cause of postoperative dysphagia after anterior cervical discectomy. *Surg Neurol* 2007; 67: 499-503.
15. Kim TT, Ludwig S, Gelb D, Poelstra KA. Diagnosis and management of postoperative wound infections of the cervical spine. *Cur Opin Orthop* 2007; 18: 276-81.
16. Khaleeq S, Khaleeq-uz-Zaman, Mir WA. Corpectomy a new indication in the management of multilevel cervical disc prolapse. *Ann Pak Inst Med Sci* 2010; 6: 28-30.
17. Chatley A, Kumar R, Jain VK, Behari S, Sahu RN. Effect of spinal cord signal intensity changes on clinical outcome after surgery for cervical spondylitic myelopathy. *J Neurosurg Spine* 2009; 11: 562-7.
18. Barrey C, Monsnier T, Jund J, Perrin J, Skalli W. In vitro evaluation of a ball and socket cervical disc prosthesis with cranial geometric center. *J Neurosurg Spine* 2009; 11: 538-46.
19. Chang UK, Kim DH, Lee MC, Willenberg R, Kim SH, Lim J. Changes in adjacent level disc pressure and facet joint force after cervical arthroplasty compared with cervical discectomy and fusion. *J Neurosurg Spine* 2007; 7: 33-9.
20. Sasso R C, Garrido B J. Postoperative spinal wound infections. *J Am Acad Orthop Surg* 2008; 16: 330-7.
21. Al-Shatoury HAH, Galhom AA. Cervical spondylosis [Online] 2009 [Cited on May 24, 2009]. Available from: [URL://http://www.emedicine.medscape.com/physical\\_medicine\\_and\\_rehabilitation\\_cervical\\_spondylosis.html](http://www.emedicine.medscape.com/physical_medicine_and_rehabilitation_cervical_spondylosis.html)
22. Kwon JW, Lee JW, Kim SH, Choi JY, Yeom JS, Kim HJ, et al. Cervical interlaminar epidural steroid injection for neck pain and cervical radiculopathy: effect and

- prognostic factors. *Skeletal Radiol* 2007; 36: 431-6.
23. Windsor RE, Nieves RA, Sullivan KP and Hiester ED. Cervical discogenic pain syndrome. [Online] 2009 [Cited on February 02, 2010]. Available from: URL://http://www.emedicine.medscape.com/sports\_medicine\_cervical\_discogenic\_pain.html
  24. Wright IP, Eisenstein SM. Anterior cervical discectomy and fusion without instrumentation. *Spine (Phila Pa 1976)* 2007; 32: 772-5.
  25. Kaye AH. Cervical disc disease and cervical spondylosis. In: Kaye AH, ed. *Essential neurosurgery*. 3rd ed. Massachusetts: Blackwell Publishing, 2005: 197-205.
  26. Ali MH, Vashdev, Shaikh BF, Choudhry AM. Changes in sensory and motor functions after surgical management of cervical prolapsed intervertebral disc by the anterior approach. *Med Channel* 2009; 15: 191-3.
  27. Bhadra AK, Raman AS, Casey AT, Crawford RJ. Single – level cervical radiculopathy: clinical outcome and cost – effectiveness of four techniques of anterior cervical discectomy and fusion and disc arthroplasty. *Eur Spine J* 2009; 18: 232-7.
  28. Lee JY, Luehr M, Impekoven P, Koebke J, Ernestus RI, Ebel H, et al. Small keyhole transuncal foraminotomy for unilateral cervical radiculopathy. *Acta Neurochir (Wien)* 2006; 148: 951-8.
  29. Khan IU, Burhan M. Titanium miniplates use: a simple and effective method of preventing bone graft dislodgment in anterior cervical discectomy and fusion. *Rawal Med J* 2009; 34: 7-10.
  30. Chang FY, Chang MC, Wang ST, Yu WK, Liu CL, Chen TH. Can povidone – iodine solution be used safely in a spinal surgery? *Eur Spine J* 2006; 15: 1005-14.
  31. Fang A, Hu SS, Endres N, Bradford DS. Risk factors for infection after spinal surgery. *Spine (Phila Pa 1976)* 2005; 30: 1460-5.
  32. Fountas KN, Kapsalaki EZ, Nikolakakos LG, Smisson HF, Johnston KW, Grigorian AA, et al. Anterior cervical discectomy and fusion associated complications. *Spine* 2007; 32: 2310-7.
  33. Jallo GI, Marcovici A. Diskitis. [Online] 2009 [Cited on August 22, 2009]. Available from: URL://http://www.emedicine.medscape.com/orthopedic\_surgery\_diskitis.html
  34. Olsen MA, Nepple JJ, Riew KD, Lenke LG, Bridwell KH, Mayfield J, et al. Risk factors for surgical site infection following orthopaedic spinal operations. *J Bone Joint Surg Am* 2008; 90: 62-9.
  35. Pappou IP, Papadopoulos EC, Sama AA, Girardi FP, Cammisa FP. Postoperative infections in interbody fusion for degenerative spinal disease. *Clin Orthop Relat Res* 2006; 444: 120.
  36. Dai LY, Chen WH, and Jiang LS. Anterior instrumentation for the treatment of pyogenic vertebral osteomyelitis of thoracic and lumbar spine. *Eur Spine J* 2008; 17: 1027-34.
  37. White BD, Buxton N, Fitzgerald JJ. Anterior cervical foraminotomy for cervical radiculopathy. *Br J Neurosurg* 2007; 21: 370-4.
  38. Ranjan A, Lath R. Microendoscopic discectomy for prolapsed lumbar intervertebral disc. *Neurol India* 2006; 54: 190-4.
  39. Haufe SMW, Mork AR. Complications Associated with cervical endoscopic discectomy with the holmium laser. *J Clin Laser Med Surg* 2004; 22: 57-8.
  40. Butler JS, Devitt BM, Poynton AR. Is aggressive surgery necessary for acute postoperative deep spinal wound infection? *Spine (Phila Pa 1976)* 2009; 34: 751-2.
  41. Hidalgo – Ovejero AM, Otermin – Maya I, Garcia – Mata S, Barberena – Ayensa LM. Is aggressive surgery necessary for acute postoperative deep spinal wound infection? *Spine (Phila Pa 1976)* 2009; 34: 750-1.
  42. Sell P. Comments on ‘Surgical treatment of pyogenic vertebral osteomyelitis with spinal instrumentation’. *Eur Spine J* 2007; 16: 1317-8.
  43. Heyde CE, Boehm H, El Saghir H, Tschöke SK, Kayser R. Surgical treatment of spondylodiscitis in the cervical spine: a minimum 2 – year follow-up. *Eur Spine J* 2006; 15: 1380-7.