

SURGICAL OF LUMBAR DISC HERNIATION AT ZAINOEL ABIDIN GENERAL HOSPITAL BANDA ACEH: EXPERIENCE WITH 28 PATIENTS

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Abstrak. Pembedahan adalah salah satu opsi didalam penanganan HNP Lumbal apabila penanganan secara konservatif mengalami kegagalan. Hasil pengobatan HNPL di Rumah Sakit Umum dr. Zainoel Abidin Banda Aceh belum pernah dilaporkan sebelumnya. Oleh karena itu penelitian ini melaporkan hasil operasi pada HNPL periode tahun 2010-2012. Penelitian ini dilakukan secara retrospektif. Operasi HNPL dalam periode tersebut adalah pada 28 pasien. Tidak ditemukan HNPL pada kelompok umur group 1 (1-18 tahun), pada kelompok umur group II (19-40 tahun) didapatkan 7 pasien (25%), dan pada kelompok group III (usia lebih 40 tahun) didapatkan pada 21 pasien (75%). Berdasarkan lokasi, L2-L3 didapatkan pada 1 pasien (3.57%), L4L5 pada 20 pasien (71,42%), L5-S1 pada 3 pasien (10,71%), dan 4 pasien pasien HNPL dengan lokasi ganda. Kesimpulannya, lokasi tersering dari HNPL adalah di L4-5. Opsi pembedahan pada HNPL perlu dipertimbangkan apabila pengobatan secara konservatif mengalami kegagalan (dicoba secara konservatif dalam kurun waktu 6 minggu-6 bulan). Hemilaminektomi dan disektomi adalah prosedur tersering pada pembedahan HNPL di Rumah Sakit umum dr. Zainoel Abidin, Banda Aceh. (JKS 2014;3: 146-151)

Kata kunci: Hernia nukleus pulposus, terapi pembedahan, hernia pada vertebra lumbal

Abstract. Surgery is one of the options in HNPL management if standar conservative treatment failed. HNP surgery results in Aceh have not been reported yet. Therefore, this study reported the HNPL surgery in Zainoel Abidin General Hospital, Banda Aceh period 2010-2012. This research was a descriptive retrospective. The incidence of HNPL who underwent surgery was 28 patients. There was no HNPL case in the age group I (0-18 years), age group II (19-40 years) was 7 patients (25%), and age group III (over 40 years) was 21 patients (75%). Based on HNPL location, no HNPL located in the L1-L2 and L3-L4, L2-L3 was 1 patient (3.57%), L4-L5 was 20 patients (71.42%), L5-S1 was 3 patients (10.71%), and there were 4 patients HNPL in multiple lumbar (14.28%). Hemilaminectomy was the most common type of surgery performed (27 patients or 96.42%), followed by laminotomy (1 patients or 3.57%). In summary, the most common lumbar disc herniation was in L4-L5. The surgical option is only for the patients that failed conservative treatment (in six weeks- six months period). Hemilaminectomy was the most common procedure performed in HNP patient in Aceh. (JKS 2014;3: 146-151)

Keywords: Herniated nucleus pulposus, herniated nucleus pulposus surgery, lumbar disc herniation

Introduction

Herniated nucleus pulposus lumbalis (HNPL) is a disease in which the intervertebral disc (soft gel disc or nucleus pulposus) pressed and ruptured, resulting in narrowing and pressed of spinal nerve. The cause of HNPL is still unclear, but several conditions have been associated with HNPL incidence including trauma,

lifting injuries, age, sex, smoking, exposure to vehicle vibration, and idiopathic.¹ It was also reported that HNP is more common among fulltime workers and smokers.² But in our opinion many HNPL patient that operated on at Zainoel Abidin Hospital no relation with fulltime worker and very close relation with smoker. HNPL causes large morbidity in patient because HNPL triggers to release inflammatory mediators that can directly cause pain, even in the absence of nerve compression.³ We don't know exactly

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about this phenomenon, because we didn't examine the inflammatory mediator in our hospital. The incidence and prevalence of HNPL has been widely reported. The incidence and prevalence of HNPL are vary in some countries. The prevalence of symptomatic HNPL in Finland is about 1.03%.⁴ Prevalence of HNP in the U.S.A is approximately 1.6% of the population,⁵ whereas in England is about 2.2% of the population.⁶ Prasad et al.⁷ examined the epidemiology of HNPL in tertiary care hospitals in India which showed that the incidence of HNPL was approximately 13.3% of the population. Previously, Anderson [8] showed that the incidence of sciatica caused by HNPL was about 1-3% of the population. Overall, the incidence of HNPL is about 0.7 to 9.0% of the population and the prevalence is about 2.2 to 8% of the population.²

Surgery is one of the options on HNPL management if conservative treatment failed. Although 90% quality of life patients improves with nonsurgical management, however 10-15% of cases require surgical management.⁹ Several studies have reported that HNPL surgery has good results. Tejapongvorachai et al¹⁰ reported that surgery (discectomy procedure) in HNP patients has a good effectiveness. Another study¹¹ documented (percutaneous disc decompression technique has a good effectiveness in relieving radicular pain among HNP patients. Koga et al¹² reported a small surgical incision in HNPL patients resulted good outcome.

However, recently, there has been no study HNP surgery in Aceh. In this context, this study was conducted to explore some aspects of HNPL surgery in Zainoel Abidin General Hospital, Banda Aceh, and the only one hospital that can perform HNPL surgery in Aceh.

Methods

1. Study design

This study was a descriptive retrospective survey in Zainoel Abidin General Hospital, Banda Aceh, in August-September 2012. Sample of this study was all HNPL patients who underwent surgery in Zainoel Abidin General Hospital period 2010-2012. This study approved by the Institutional Review Board (IRB) Zainoel Abidin General Hospital.

2. Data collection

Data was collected from Medical Record Department of Zainoel Abidin General Hospital. Between January 2010 and August 2012, 28 HNPL patients who underwent surgery were documented. The following documented and potentially clinically relevant variables were employed for all outcomes: sex, age, intervertebral level of the intervention, and type of surgery.

3. Statistical analysis

All data obtained were presented descriptively and analyzed by one-way analysis of variance (Anova) to compare patient characteristics gender, age, intervertebral level of the intervention, and type of surgery with HNPL incidence.

Results

This research reported the incidence of surgical on HNPL patients in Zainoel Abidin General Hospitals. The total number of HNPL patients who underwent surgery in Zainoel Abidin General Hospital in period 2010-2012 shown in Figure 1. In addition, this study also reported relationship between patient characteristics (sex, age) and HNPL incidence; HNPL location and type of procedure related HNPL (table 1).

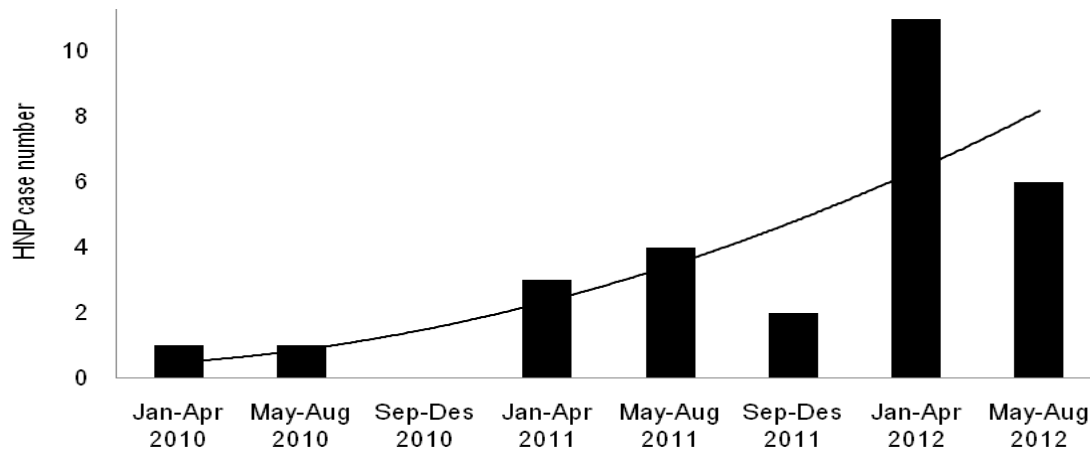


Figure 1. Distribution of HNPL cases in Zainoel Abidin General Hospital period 2010-2012. There were 28 HNPL patients who underwent surgery in given period; the highest incidence rate was in period January-April 2012 with 11 patients.

Table 1. The relationship between patient characteristics, HNP location, and type of procedure and HNPL incidence

Variables	n (%)	p
Age		0.003
19-40	7 (25)	
>40	21 (75)	
Gender		NS
Male	14 (50)	
Female	14 (50)	
HNP location		0.000
Lumbar	25 (89.28)	
Sacral	3 (10.72)	
Level of lumbar disc		0.000
L2-L3	1 (3.57)	
L4-L5	20 (71.42)	
L5-S1	3 (10.71)	
Multiple location	4 (14.28)	
Type of procedure		0.001
Hemilaminectomy with discectomy	27 (96.42)	
Laminotomy with discectomy	1 (3.57)	

NS, not significant

Vast majority (75%) patients, in this study, were more than 40 year and the incidence of HNPL in men and women were equal. In this study, we found that most HNPL patients were located in the lumbar (89.28%). Surgery is one of the procedures for patients with symptomatic HNPL to improve patient condition.^{13,14} In this study, hemilaminectomy with discectomy was the most common procedure used in HNPL patients (96.42%) followed by laminotomy with discectomy.

Discussion

Age is often associated with the risk of some diseases. However, the association between age and incidence of HNPL is still controversial. This study found that age was associated with HNPL. The theoretical concept of the relationship between age and HNPL incidence is still not well understood. Katsuno et al.¹⁵ conducted a study to elucidate the relationship of age to the production of nitride oxide (NO) and cytokines which is associated with nucleus

pulposus cells. It showed that NO levels increase with age. It indicates that the inflammatory reaction increases with increasing of age. It also showed that age associated with cytokine imbalance. Stress and aging affect the extracellular matrix components and changes in immune responses. Katsuno et al.¹⁵ suggested that the nucleus pulposus have cell-mediated immunity activity higher in young than in elderly. In contrary, there was no significant association between the incidences of HNPL due to trauma with patient age.¹⁶

Interestingly, Yorimitsu et al.¹⁷ showed that the majority of the HNP patients were less than 35 years of age. This study found that some young adults who have HNPL. The incidence of HNPL in young was not widely studied yet. However, it is suspected that there is the role of gene. Higashino et al.¹ found that patients aged less than 40 years with tryptophan allele (Trp2) showed more severe disc degeneration than those who do not have the allele Trp2. Conversely, patients aged 40 years or older showed no significant association between allele Trp2 with disc degeneration. This data suggest that the allele Trp2 is an age-dependent risk factor for severity of disc degeneration in young patients with HNPL.

The association between sex with the incidence of HNPL is still not well understood. This indicates that there is no clear correlation between sex with the risk of HNPL. This result is consistent with the results of previous studies. Rizzolo et al.¹⁶ found that there was no significant association between HNPL due to trauma with sex. This is also supported by Burke et al.¹⁸ which examines the proinflammatory mediators in patients with HNPL. It showed that interleukin (IL)-6, IL-8, and prostaglandin E2 (PGE2) was increased in patients with HNPL, but increased inflammatory mediators is not related to the gender of the patient.

HNPL can occur in the cervical, thoracic, lumbar, and sacral. In this study, most of HNPL was located in lumbar (89.28%). This result is consistent with the study of computed tomography scans performed by Delauche-Calvaller et al.¹⁹ It showed that lumbar HNPL was most frequently found among patients observed. In line with data, Varanasi [20] also showed that most cases of HNPL (95%) occurred in the lumbar region, followed by cervical and thoracic regions, about 0.5 to 4% of all cases. In addition, this study found that most patients had HNPL at L4-L5 followed by L5-S1 and L2-L3. This result was consistent with previous studies that the most common level involved in lumbar disc herniation was L4-L5 followed by L5-S1.^{21,22,23} Recent study conducted by Udama et al.²⁴ also showed that the most common site of HNPL was in the lumbar and the site of predilection was L4-L5 disc cartilage.

Surgery in patients with lumbar HNP is the main choice of therapy. Weinstein et al.²⁵ compared the results of non-surgical management with surgery in patients with lumbar HNP. It indicates that surgery may improve the symptoms of the patient much better than non-surgical management. Peul et al.²⁶ also showed that surgery in patients with sciatica due to lumbar HNP can improve symptoms faster compared with conservative management. Discectomy is a common and generally successful treatment for lumbar disc herniation.²⁷

Methods for performing discectomy are divided into minimal invasive and conventional. Conventional methods to perform discectomy are laminotomy and laminectomy.²⁸ The effectiveness of laminectomy in patients with HNPL has been reported by several studies. Siddiq et al.²⁹ found that laminectomy is most preferred surgery in patients with HNPL. Although laminectomy is a type of surgery that is considered expensive³⁰ but this type of surgery is considered effective for recurrent HNPL.³¹ Hirsch et al.³² showed

that discectomy clearly association with reduced symptoms in patients with HNPL. Koga et al.¹² showed that discectomy is the gold standard surgery for patients with a recurrent HNPL. Glenn et al.³³ also showed that discectomy is the gold standard for recurrent HNPL and herniation that has been occurred in 3 locations. The types of surgery on HNPL differ according to location. Tejapongvorachai et al.¹⁰ suggested perform discectomy surgery on patients with thoracic HNPL. Nevertheless, several studies have reported the incidence of recurrent HNPL complications after discectomy. Some studies have reported the incidence of recurrent HNPL after discectomy.^{34,35}

In summary, in this study, HNPL was common in elderly and there was no association between HNPL incidence and sex. Lumbar, specifically L4-L5 was the most common location for HNPL and hemilaminectomy with discectomy was the most common procedure performed followed by laminotomy with discectomy.

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References

1. Higashino K, Matsui Y, Yagi S, Takata Y, Goto T, Sakai T, Katoh S, Yasui N. The alpha2 type IX collagen tryptophan polymorphism is associated with the severity of disc degeneration in younger patients with herniated nucleus pulposus of the lumbar spine. *Int Orthop* 2007;31(1):107-11.
2. Levin JH, Smuck MW. Radiculopathy from herniation of the nucleus pulposus: Epidemiology, pathophysiology and natural history. *J Back Musculo Rehab* 2007;20:97-101.
3. Shamji MF, Jing L, Chen J, Hwang P, Ghodsizadeh O, Friedman AH, Richardson WJ, Setton LA. Treatment of neuroinflammation by soluble tumor necrosis factor receptor Type II fused to a thermally responsive carrier. *J Neurosurg Spine* 2008;9(2):221-8.
4. Heliövaara M, Knekt P, Aromaa, A. Incidence and risk factors of herniated lumbar intervertebral disc or sciatica leading to hospitalization. *J Chronic Dis* 1987;40(3):251-8.
5. Deyo RA, Tsui-Wu YJ. Descriptive epidemiology of low-back pain and its related medical care in the United States. *Spine* 1987;12(3):264-8.
6. Lawrence JS. *Rheumatism in populations*. Heinemann: London; 1977.
7. Prasad R, Hoda MF, Dhakal MM, Singh K, Srivastava A, Sharma V. Epidemiological characteristics of lumbar disc prolapse in a tertiary care hospital. *The Internet J Neurosurg* 2006;3(1).
8. Andersson GBJ. The epidemiology of spinal disorders. In: Frymoyer JW. *The Adult Spine: Principles and practice*. 2nd ed. New York: Raven Press; 1997.
9. Maity A., Mondal BC, Saha D, Roy DS. A prospective randomized, double-blind, controlled clinical trial comparing epidural butorphanol plus corticosteroid with corticosteroid alone for sciatica due to herniated nucleus pulposus. *Perspect Clin Res* 2012;3(1):16-21.
10. Tejapongverachai T, Kuptaniratsaikul S, Ittiravivong P, Bohiman HH. Herniated nucleus pulposus of thoracic spine: treated by anterior trans thoracic discectomy. *Chula Med J* 2002;48(10):802-12.
11. Lee SH, Derby R, Sul DG, Hong JW, Kim GH, Kang S, Kim NH, Yoo SH, Lee SJ, Hong YK, Lee JE. Efficacy of a new navigable percutaneous disc decompression device (L'DISQ) in patients with herniated nucleus pulposus related to radicular pain. *Pain Med* 2011;12(3):370-6.
12. Koga S, K Sairyo, Shibuya I, Kanamori Y, Kosugi T, Matsumoto H, Kitagawa Y, Sumita T, Dezawa A. Minimally invasive removal of a recurrent lumbar herniated nucleus pulposus by the small incised microendoscopic discectomy interlaminar approach. *Asian J Endoscop Surg* 2012;5(1):34-7.
13. Kraemer J. *Intervertebral disc diseases: cause, diagnosis, treatment, and prophylaxis*. 3rd edition. Notzingen: George thieme verlag KG; 2009.

14. Phillips F, Lauryssen C. The lumbar intervertebral disc: decompressive surgery for herniated nucleus pulposus (open, micro, and minimally invasive approaches. New York: Thieme medical publisher Inc; 2010.
15. Katsuno R, Hasegawa T, Iwashina T, Sakai D, Mikawa Y, Mochida J. Age-related effects of cocultured rat nucleus pulposus cells and macrophages on nitric oxide production and cytokine imbalance. *Spine* 2008;33(8): 845-9.
16. Rizzolo SJ, Piazza MR, Cotler JM, Balderston RA, Schaefer D, Flanders A. Intervertebral disc injury complicating cervical spine trauma. *Spine* 1991;16(6s):44-52.
17. Yorimitsu E, Chiba K, Toyama Y, Hirabayashi K. Long-term outcomes of standard discectomy for lumbar disc herniation: A follow-up study of more than 10 years. *Spine* 2001;26(6):652-7.
18. Burke JG, Watson RWG, McCormack D, Dowling FE, Walsh MG, Fitzpatrick JM. Intervertebral discs which cause low back pain secrete high levels of proinflammatory mediators. *J Bone Joint Surg* 2002;84-B:196-201.
19. Delauche-Cavallier M, Budet C, Laredo J, Debie B, Wybier M, Dorfmann H, Ballner I. Lumbar disc herniation: Computed tomography scan changes after conservative treatment of nerve root compression. *Spine* 1992;17(8):87-96.
20. Varanasi VJ. Lumbar disc herniation. *Orthopedic Muscul Sys* 2012;1(1):1000e101.
21. Scott S. Cauda Equina Syndrome Secondary to Lumbar Disc Herniation. *Neurosurg* 1993;32(5):743-7.
22. Suk K, Lee H, Moon S, Kim N. Recurrent lumbar disc herniation: results of operative management. *Spine* 2001;26(6):672-6.
23. Kaushal P, Jha R, Kumar P, Sharma GR. Lumbar disc herniation in children and adolescents: A case series. *Nepal J Neurosci* 2012;9:17-20.
24. Udama FU, Fokam PG, Motah M. Uncommon types of disc hernia (Areport of three cases and review of literature). *Global J Med Res* 2011;11(2):42-8.
25. Weinstein JN, Lurie JL, Tosteson TD, Tosteson ANA, Blood E, Abdu WA, Herkowitz H, Hilibrand A, Albert T, Fischgrund J. Surgical versus non-operative treatment for lumbar disc herniation: Four-year results for the Spine Patient Outcomes Research Trial (SPORT). *Spine* 2009;33(25):2789-800.
26. Peul WC, van den Hout WB, Brand R, Thomeer RTWM, Koes BW. Prolonged conservative care versus early surgery in patients with sciatica caused by lumbar disc herniation: two year results of a randomised controlled trial. *BMJ* 2008;336:1355.
27. Kleinstück FS, Fekete T, Jeszenszky D, Mannion AF, Grob D, Lattig F, Mutter U, Porchet F. The outcome of discectomy for lumbar herniated disc is influenced by the severity of concomitant pre-operative low back pain. *Spine* 2010;1(1):44.
28. Smith GI. Coding surgical procedure. New York: Delmar; 2011.
29. Siddiq M, Ali N, Jan WA, Dil R. Surgical management of lumbar disc herniation by standard laminectomy in a periphery hospital; an experience with 64 patients. *JPMI* 2011;17(1):20-5.
30. Ramirez LF, Javid MJ. Cost effectiveness of chemonucleolysis versus laminectomy in the treatment of herniated nucleus pulposus. *Spine* 1985;10(4):363-7.
31. Khattak AU, Haider A, Rehman A, Ilyas M. Surgical outcome of recurrent lumbar disc herniation: experience with 30 patients. *JPMI* 2009;23(1):86-9.
32. Hirsch JA, Singh V, Falco FJE, Benyamin RM, Manchikanti L. Automated percutaneous lumbar discectomy for the contained herniated lumbar disc: A systematic assessment of evidence. *Pain Physician* 2009;12:601-20.
33. Glenn JS, Yaker J, Guyer RD, Ohnmeiss DD. Anterior discectomy and total disc replacement for three patients with multiple recurrent lumbar disc herniations. *Spine* 2011;11(9):e1-e6.
34. McGirt MJ, Ambrossi GLG, Datto G, Sciubba DM, Witham TF, Wolinsky J, Gokaslan ZL, Bydon A. Recurrent disc herniation and long-term back pain after primary lumbar discectomy: Review of outcomes reported for limited versus aggressive disc removal. *Neurosurg* 2009;64(2):338-45.
35. Ambrossi GLG, McGirt MJ, Sciubba DM, Witham TF, Wolinsky J, Gokaslan ZL, Long DM. Recurrent lumbar disc herniation after single-level lumbar discectomy: Incidence and health care cost analysis. *Neurosurg* 2009;65(3):574-8.