LOMBER SPİNAL STENOZ TEDAVİSİNDE MİKRO-HEMİLAMİNEKTOMİ veya LAMİNEKTOMİ SEÇENEKLERİ

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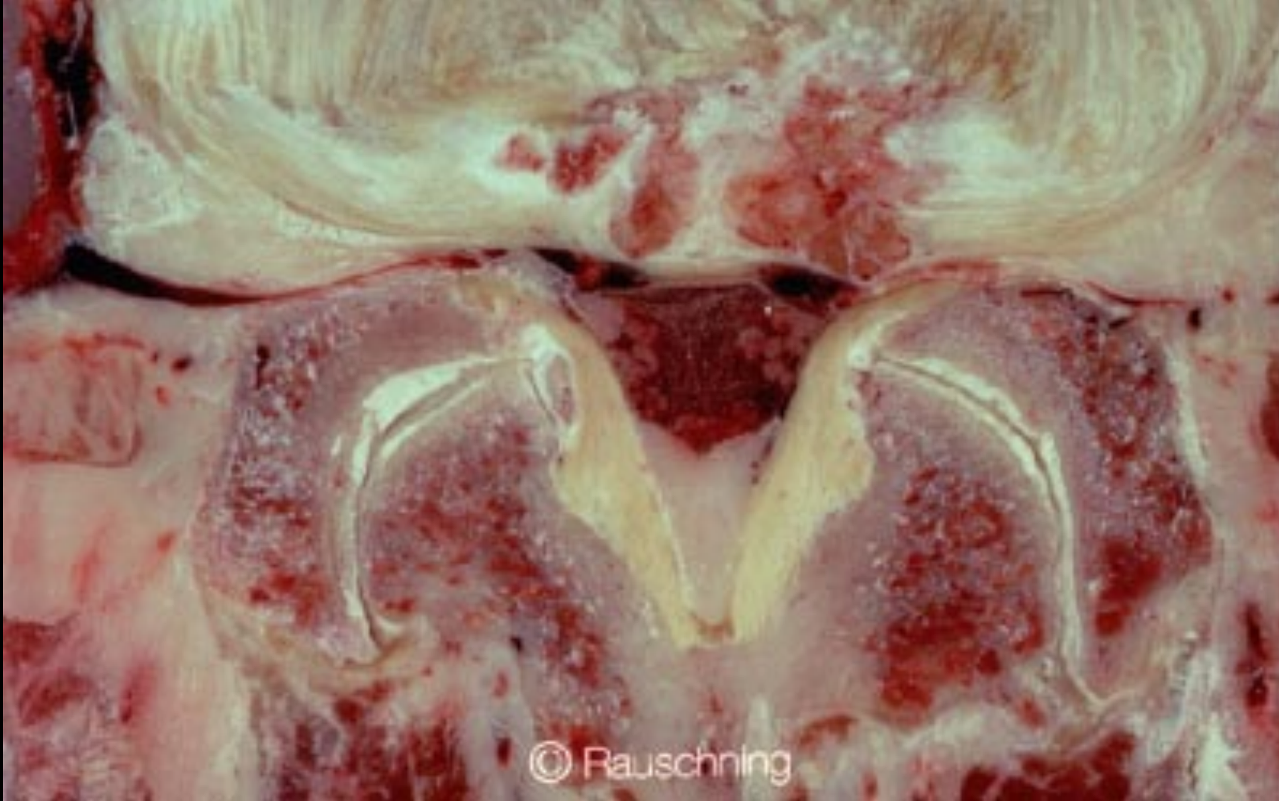
İTÜ, Fen Bilimleri Enstitüsü

Lomber Spinal Stenoz

- KONJENİTAL
  - İdiopatik
  - Akandroplastik
  - Osteopetrozis

- ERİŞKİN
  - Dejeneratif
    - Santral
    - Lateral reses veya foraminal
    - Dejeneratif spondilolistezis
  - İyatrojenik
  - Travmatik
  - Diğer (Paget, Ankilozan spondilit,...)

Konuşma Konusu Olgular

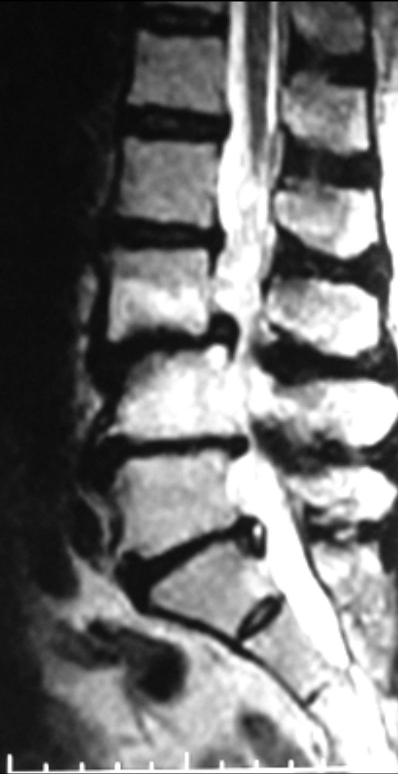


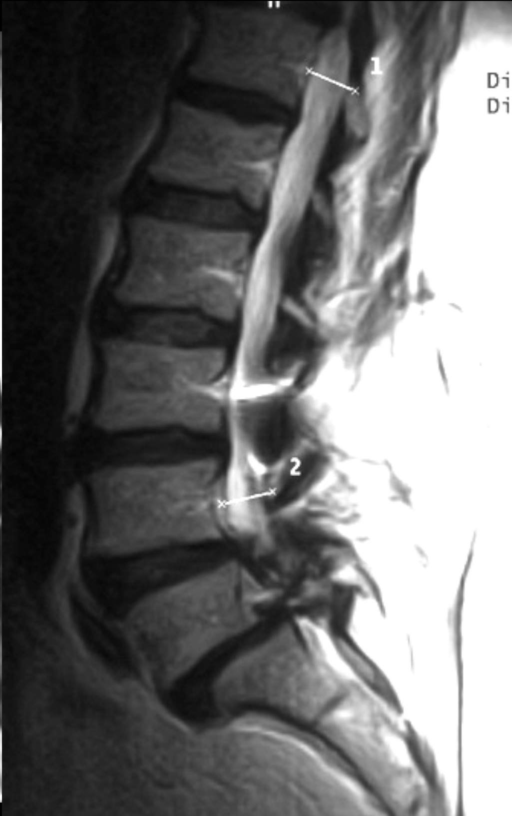
BT' de spinal kanal çapı 11 mm' den az

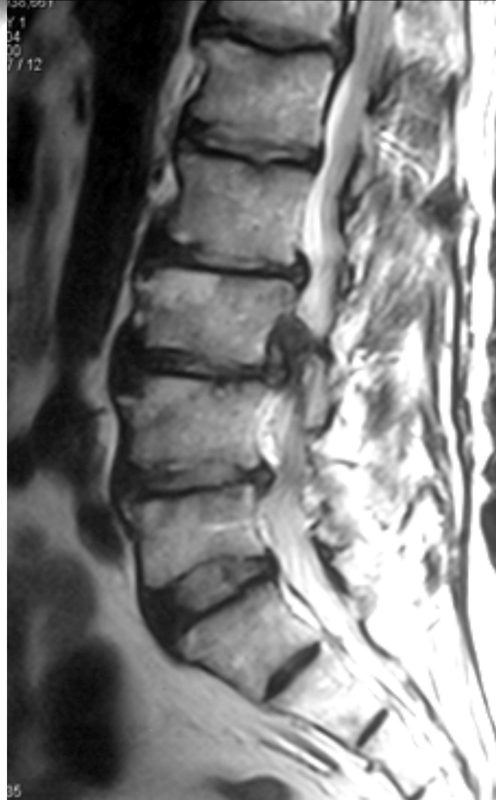
İnterpedinküler mesafe ≥16 mm

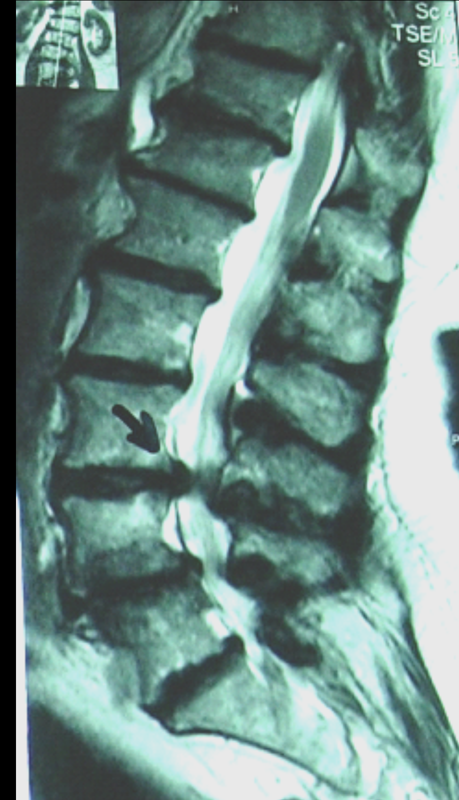
Kanal alanı ≥ 1.45 cm^2

Konuşma Konusu Olmayan Olgular







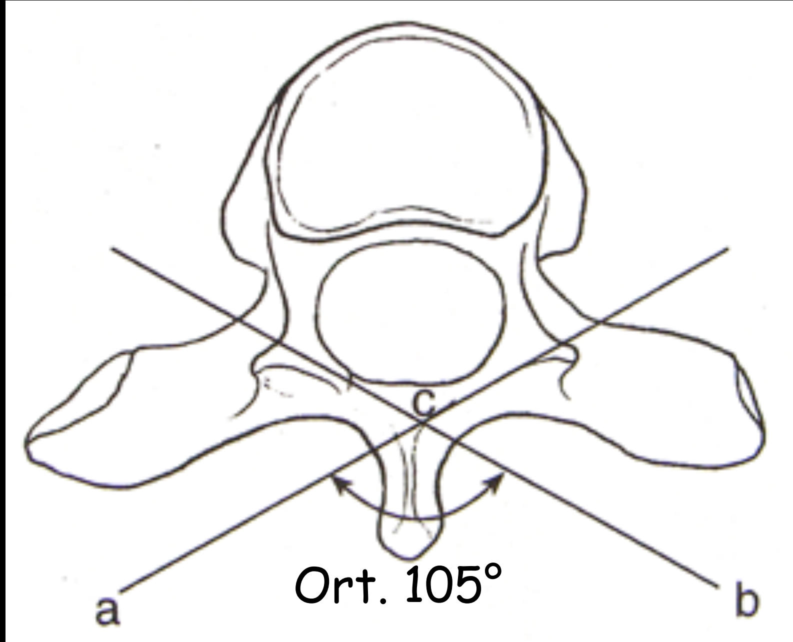


- ERİŞKİN
  - Dejeneratif
    - Santral
    - Lateral reses veya foraminal

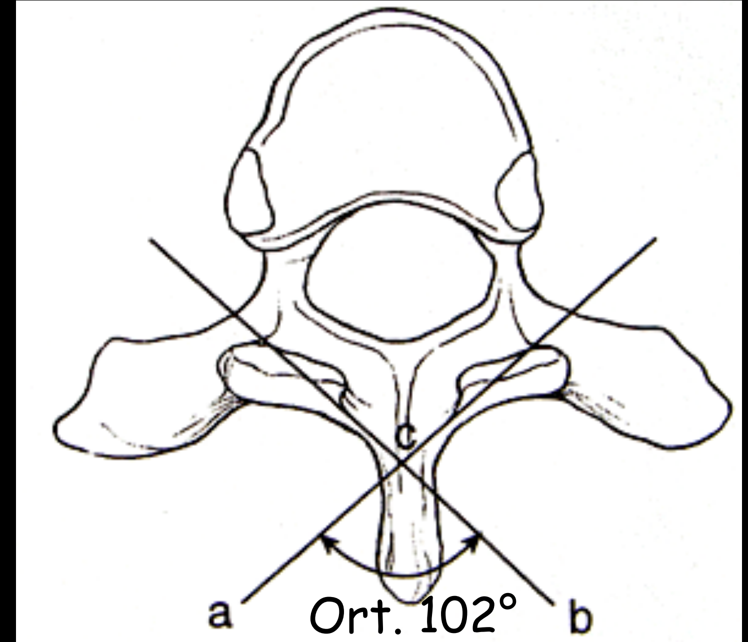
- Nörojenik klodikasyon veya radikular ağrı kliniği var
- Radyolojik olarak spinal dejenerasyon var
- Konservatif tedaviye cevap yok
- Disk hernisi veya instabilite yok
- Daha önce geçirilmiş lomber stenoz/füzyon cerrahisi anamnezi yok

Lamina Morfometrisi

üstten bakış



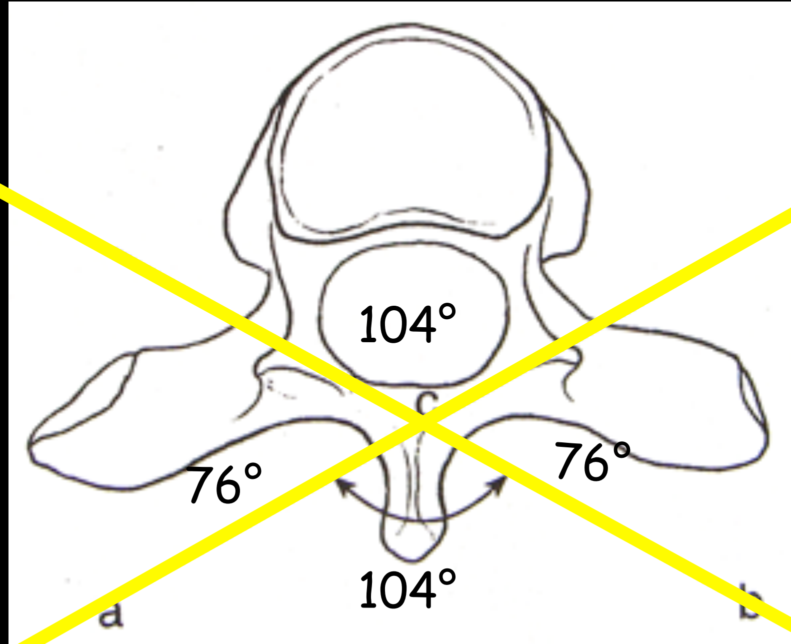
alttan bakış



	üstten bakış	alttan bakış
L1	114	97
L2	111	92
L3	108	92
L4	99	107
L5	95	121

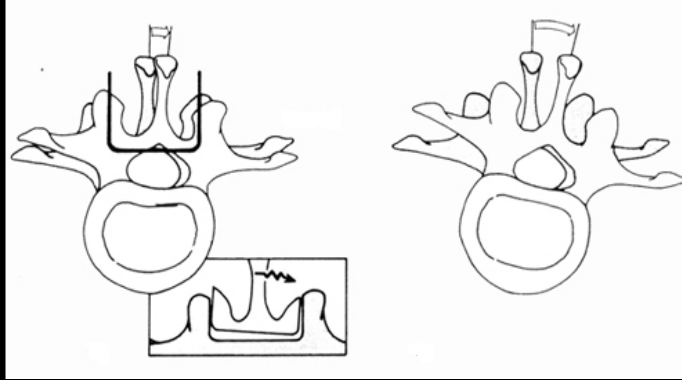
Xu R ve ark., Spine 1999

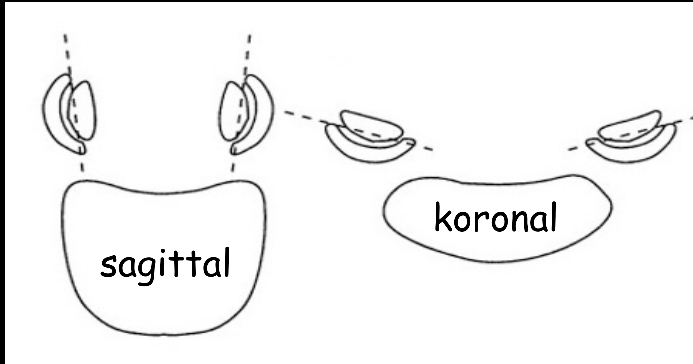
Hemilaminektomide Görme Açısı

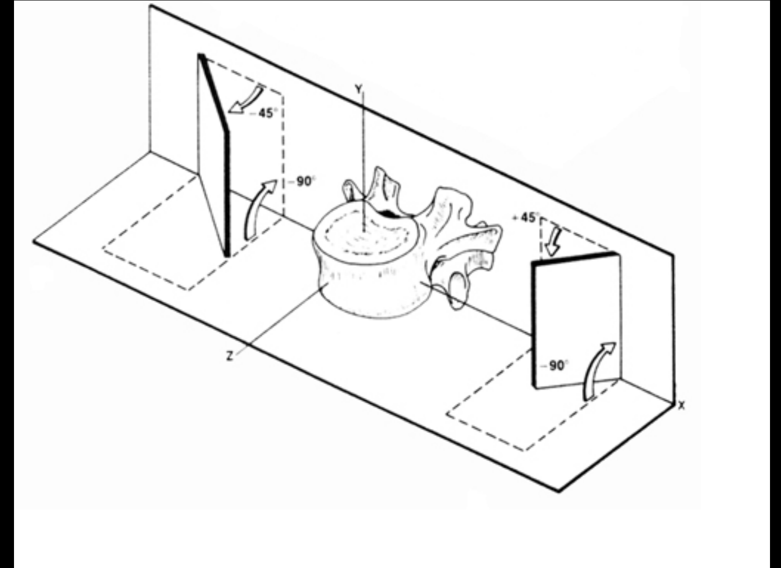


Minimum 76° + Mikroskop açısı

Faset Morfometrisi

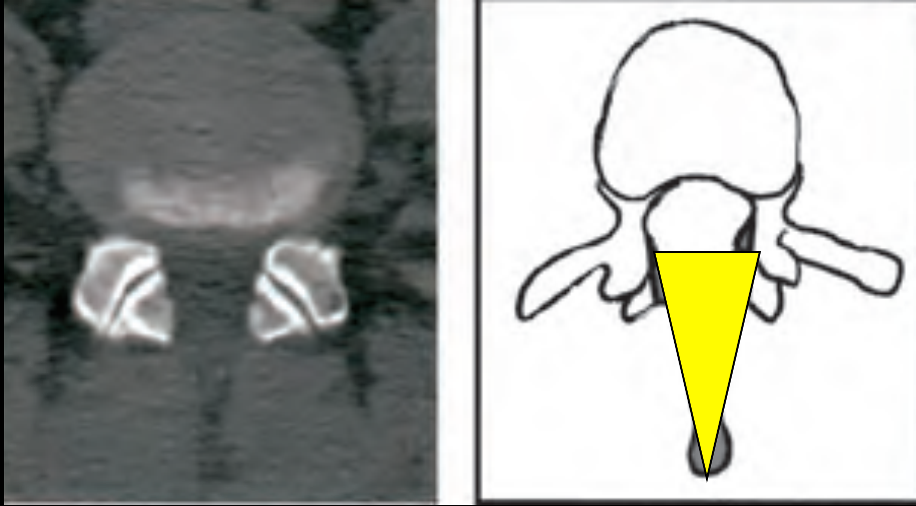






Sagittal plandaki faset rezeksiyonu öne translasyona ve aksiyal rotasyona izin verir.

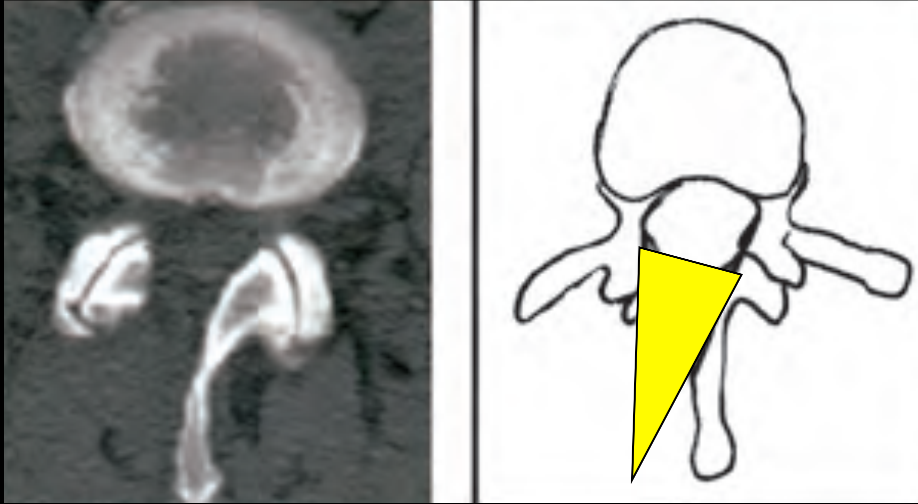
Laminektomi



Rezeksiyon alanı;

- Spinoz proses
- Bilateral lamina
- Bilateral faset medyal yüzü
- Bilateral flavum

Hemilaminektomi

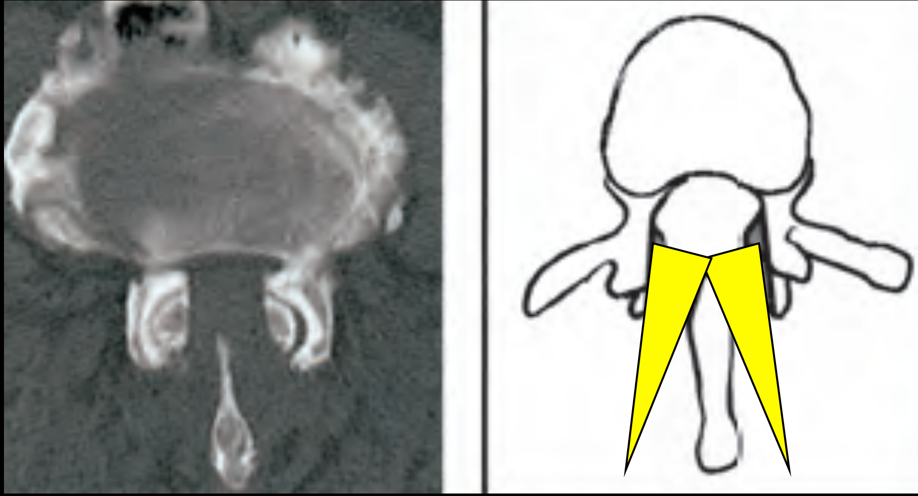


Rezeksiyon alanı;

- Unilateral lamina
- Unilateral faset medyal yüzü
- Spinoz proses altı
- Uni ve kontralateral flavum

Supra/interspinoz ligaman ve bir kısım spinoz proses sağlam kalıyor.

Alternatif Yöntem ?
Bilateral Laminatomi



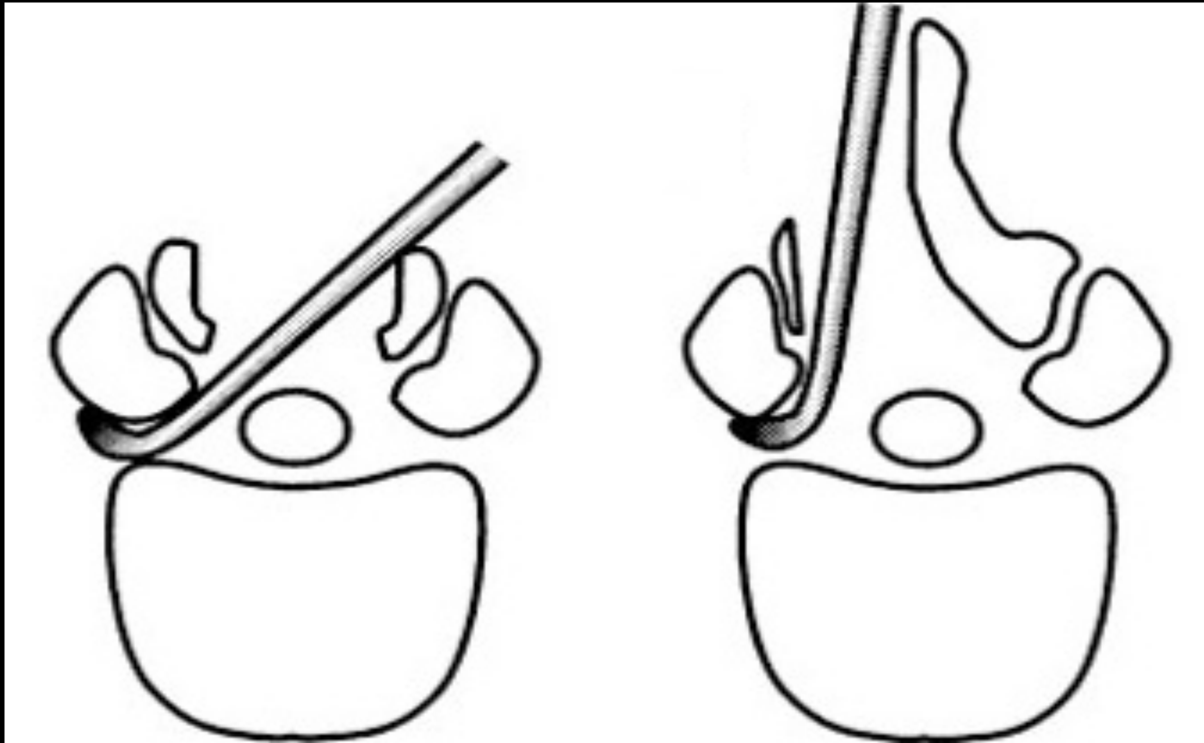
Rezeksiyon alanı;

- Bilateral komşu laminaların üst ve alt yüzü
- Bilateral faset medyal yüzü
- Bilateral parsiyel flavum

Spinoz proses, supra/inter spinoz ligaman, bir kısım lamina sağlam kalıyor.

Laminektomi/Mikro-Hemilaminektomi Çalışma Alanı

MİKROSKOP !

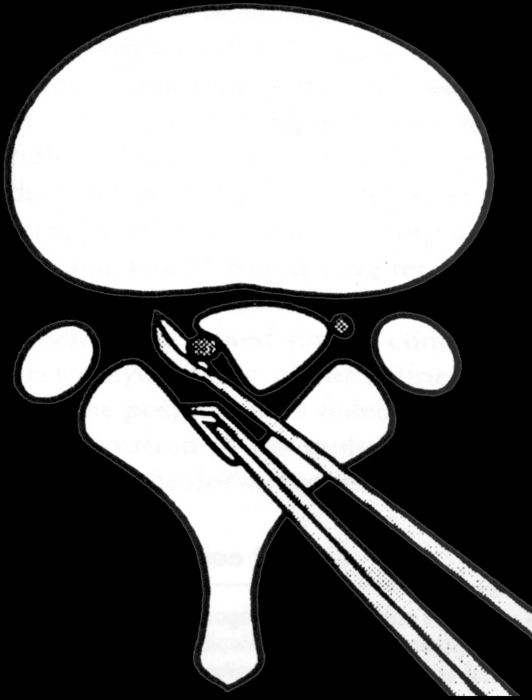


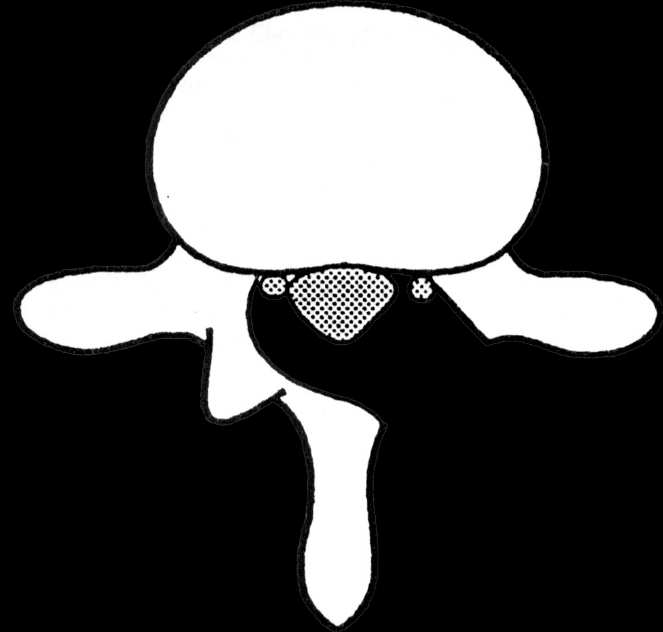
Geniş açı

Dar açı

Mikro-Hemilaminektomi

1988 Young (ilk)
1999 McCulloch (modifiye şekli)





Neurosurgery 23: 628-633, 1988
Spine 24 (21): 2268-2272, 1999

Laminektomi/Parsiyel Fasetektomi

J Neurosurg 77:669–676, 1992

Long-term evaluation of decompressive surgery for degenerative lumbar stenosis

ANTHONY J. CAPUTY, M.D., AND ALFRED J. LUESSENHOP, M.D.

TABLE 3

Outcomes with laminectomy and partial facetectomy

Authors & Year	No. of Cases	Age (yrs)	Outcome	Follow-Up Period
Getty, 1980	20	mean 52 (18–75)	good 55%, fair 25%, poor 20%, reop 20% (50% good)	mean 3.5 yrs (1–10 yrs)
Johnsson, *et al.*, 1981	22	mean 63 (48–80)	excellent & good 59%, unchanged & poor 41%	mean 22 mos (3–79 mos)
Weir & De Leo, 1981	81	64% > 50	good 95%, unchanged 3%, worse 1%, unknown 1%, reop 7%	3 mos–12 yrs
Hall, *et al.*, 1985	68	mean 63 (32–83)	excellent & good 84%	mean 4 yrs (2.4–5.4 yrs)
Ganz, 1990	33	mean 57 (21–84)	good 82%, poor 18%	1–6 yrs

Başarı kısa dönemde %55-95

Metaanalizde Laminektominin Başarısı

Dekompresif laminektomi %64 olguda başarılıdır.

Turner JA ve ark., Spine 1992

Laminektomi Tek Başına Başarısı

J Neurosurg 81:699–706, 1994

Outcome after laminectomy for lumbar spinal stenosis

Part I: Clinical correlations

GERALD F. TUITE, M.D., JOSEPH D. STERN, M.D., STEPHEN E. DORAN, M.D., STEPHEN M. PAPADOPOULOS, M.D, JOHN E. MCGILLICUDDY, M.D., DOTUN I. OYEDIJO, B.S., SUSAN V. GRUBE, R.N., CRAIG LUNDQUIST, M.D., HOLLY S. GILMER, M.D., M. ANTHONY SCHORK, PH.D., STEVEN E. SWANSON, M.D., AND JULIAN T. HOFF, M.D.

All patients who underwent decompressive lumbar laminectomy in the Washtenaw County, Michigan metropolitan area during a 7-year period were studied for the purpose of defining long-term outcome, clinical correlations, and the need for subsequent fusion. Outcome was determined by questionnaire and physical examination from a cohort of 119 patients with an average follow-up evaluation interval of 4.6 years. Patients graded their outcome as much improved (37%), somewhat improved (29%), unchanged (17%), somewhat worse (5%), and much worse (12%) compared to their condition before surgery. Poor outcome correlated with the need for additional surgery, but there were few additional significant correlations. No patient had a lumbar fusion during the study interval.

The outcome after laminectomy was found to be less favorable than previously reported, based on a patient questionnaire administered to an unbiased patient population. Further randomized, controlled trials are therefore necessary to determine the efficacy of lumbar fusion as an adjunct to decompressive lumbar laminectomy.

%70 başarılı

Laminektomi Uzun Dönemde Nasıl ?

SPINE Volume 25, Number 14, pp 1754–1759
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Minimum 10-Year Outcome of Decompressive Laminectomy for Degenerative Lumbar Spinal Stenosis

Tetsuhiro Iguchi, MD, Akira Kurihara, MD, Junichi Nakayama, MD,* Keizou Sato, MD, Masahiro Kurosaka, MD,* and Kyoko Yamasaki, MD

Methods. Of 151 patients who underwent decompressive laminectomy from 1980 through 1989, 37 were followed up for a minimum of 10 years. The mean age at surgery was 60.9 ± 8.2 years (range, 43–76), and the average follow-up period was 13.1 ± 2.1 years (range, 10.1–17.4). The results were evaluated by the criteria of the Japanese Orthopedic Association Lumbar Score, and the outcome was classified as excellent at more than 75% improved score; good, 50–75%; fair, 25–49%; and poor, 0–24% or less. Information about impairment of activities of daily living was also obtained at follow-up. Associations between preoperative clinical and radiographic variables and clinical outcome were evaluated statistically.

Results. In all patients, the average score improvement of 55.2 ± 31.6% was regarded as acceptable. The postoperative score and percentage of improvement of low back pain were lower than those of leg pain and walking ability. No impairment in activities of daily living was found in 62.2% of the patients. Rate of improvement was evaluated as excellent in 13 (35.1%), good in 8 (21.6%), fair in 8, and poor in 8 patients. Three patients required additional surgery because of disc herniation at the laminectomied segments. The patients with multiple laminectomy ($P = 0.034$) andmore than 10° preoperative sagittal rotation angle ($P = 0.018$) showed a significantly poorer outcome than the remainder of the patients.

%56 başarı

Laminektomi Sonrası Füzyon ?

J Neurosurg 78:695–701, 1993

Decompressive lumbar laminectomy for spinal stenosis

H. Roy Silvers, M.D., P. Jeffrey Lewis, M.D., and Harold L. Asch, Ph.D.

The major conclusions arising from these data are: 1) for all age groups through at least the eighth decade of life, decompressive lumbar laminectomy is a relatively safe operation having a high medium-to-long-term success rate; 2) lumbar instability following laminectomy is rare, even in individuals presenting prior to surgery with degenerative instability conditions; and 3) lumbar fusion in addition to the decompressive laminectomy procedure is rarely required for degenerative spinal stenosis.

Laminektomi sonrası füzyon gereksiz

Laminektomi Sonrası İnstabilite

J Neurosurg 85:793–802, 1996

Clinical outcomes and radiological instability following decompressive lumbar laminectomy for degenerative spinal stenosis: a comparison of patients undergoing concomitant arthrodesis versus decompression alone

MARK W. FOX, M.D., BURTON M. ONOFRIO, M.D., AND ARLEN D. HANSSEN, M.D.

Preop. normal radyoloji

FÜZYONSUZ

Postop. Ant. listezis %31

Preop. Anterior listezis

FÜZYONSUZ	FÜZYONLU
Postop. Listezisde artış %73	Postop. Listezisde artış %26

Kimlere Laminektomi Sonrası Füzyon Yapmalı ?

- Preop. Anterior spondylolistezis (ort. 5 mm, L4-5)
- Dinamik grafilerde hareket (3 mm ve üstü)
- Dejenere L3 ve L4 disklerini içine alan dekompresyon
- Sagittal faset açısı olanlar (L4-5 için 65°)
- Birden fazla mesafede dekompresyon

Fox MW ve ark., J Neurosurg 1996

Metaanaliz (1975-1995) sonucu

- Yetersiz iyileşme; dekompresyon ve füzyon uygulananlar
- Semptomlar 8 yıl ise dekompresyon yeterli
- Semptomlar 15 yıl ise dekompresyon, füzyon ve enstrumantasyon gerekli

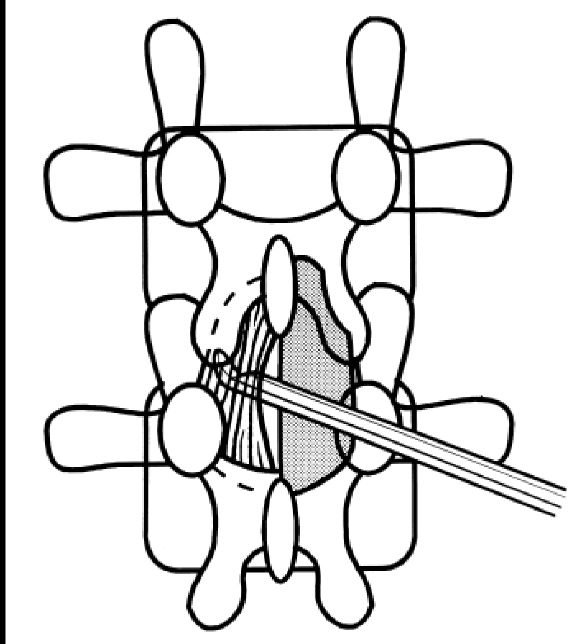
Niggemeyer O ve ark., Eur Spine J 1997

Micro-Hemilaminektomi ile Yeterli Dekompresyon ?

SPINE Volume 24, Number 21, pp 2268–2272
©1999, Lippincott Williams & Wilkins, Inc.

Microdecompression for Lumbar Spinal Canal Stenosis

Bradley K. Weiner, MD, Matthew Walker, MD, Richard S. Brower, MD, and John A. McCulloch, MD FRCS(C)



Results. The technique affords an excellent decompression while minimizing destruction to tissues not directly involved in the pathologic process. Functional outcome scores doubled, and 87% of patients reported high satisfaction rates.

Başarı %87

Uni/Bilateral Laminatomi veya Laminektomi

J Neurosurg: Spine 3:129–141, 2005

Outcome after less-invasive decompression of lumbar spinal stenosis: a randomized comparison of unilateral laminotomy, bilateral laminotomy, and laminectomy

CLAUDIUS THOMÉ, M.D., DIMITRIS ZEVGARIDIS, M.D., OLAF LEHETA, M.D., HANSJÖRG BÄZNER, M.D., CHRISTIANE PÖCKLER-SCHÖNIGER, M.D., JOHANNES WÖHRLE, M.D., AND PETER SCHMIEDEK, M.D.

Object. Recently, limited decompression procedures have been proposed in the treatment of lumbar stenosis. The authors undertook a prospective study to compare the safety and outcome of unilateral and bilateral laminotomy with laminectomy.

Methods. One hundred twenty consecutive patients with 207 levels of lumbar stenosis without herniated discs or instability were randomized to three treatment groups (bilateral laminotomy [Group 1], unilateral laminotomy [Group 2], and laminectomy [Group 3]). Perioperative parameters and complications were documented. Symptoms and scores, such as visual analog scale (VAS), Roland–Morris Scale, Short Form–36 (SF-36), and patient satisfaction were assessed preoperatively and at 3, 6, and 12 months after surgery.

Adequate decompression was achieved in all patients. The overall complication rate was lowest in patients who had undergone bilateral laminotomy (Group 1). The minimum follow up of 12 months was obtained in 94% of patients. Residual pain was lowest in Group 1 (VAS score 2.3 ± 2.4 and 4 ± 1 in Group 3; $p < 0.05$ and 3.6 ± 2.7 in Group 2; $p < 0.05$). The Roland–Morris Scale score improved from 17 ± 4.3 before surgery to 8.1 ± 7, 8.5 ± 7.3, and 10.9 ± 7.5 (Groups 1–3, respectively; $p < 0.001$ compared with preoperative) corresponding to a dramatic increase in walking distance. Examination of SF-36 scores demonstrated marked improvement, most pronounced in Group 1. The number of repeated operations did not differ among groups. Patient satisfaction was significantly superior in Group 1, with 3, 27, and 26% of patients unsatisfied (in Groups 1, 2, and 3, respectively; $p < 0.01$).

Conclusions. Bilateral and unilateral laminotomy allowed adequate and safe decompression of lumbar stenosis, resulted in a highly significant reduction of symptoms and disability, and improved health-related quality of life. Outcome after unilateral laminotomy was comparable with that after laminectomy. In most outcome parameters, bilateral laminotomy was associated with a significant benefit and thus constitutes a promising treatment alternative.

Laminatomi yeterli dekompresyon sağlıyor

Neden Fasetektomi/Laminektomi Sonrası İnstabilite ?

- Yapıların stabilizasyondaki payı;

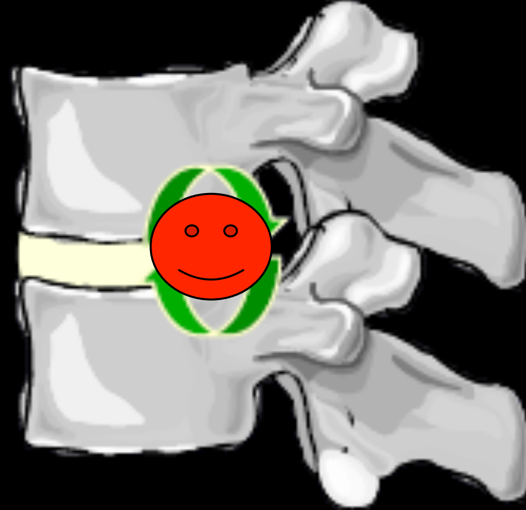
Faset eklemleri	%39
Disk ve annulus	%29
Supra/İnterspinoz ligaman	%19
Lig. Flavum	%13

Adams MA, Hutton WC, Spine 1983

Neden Fasetektomi/Laminektomi Sonrası İnstabilite ?

- Rotasyonun anlık ekseni öne doğru kayıyor

  Disk, annulus ALL ve PLL' de gerilme artıyor



Cusick JF ve ark., J Neurosurg 1992

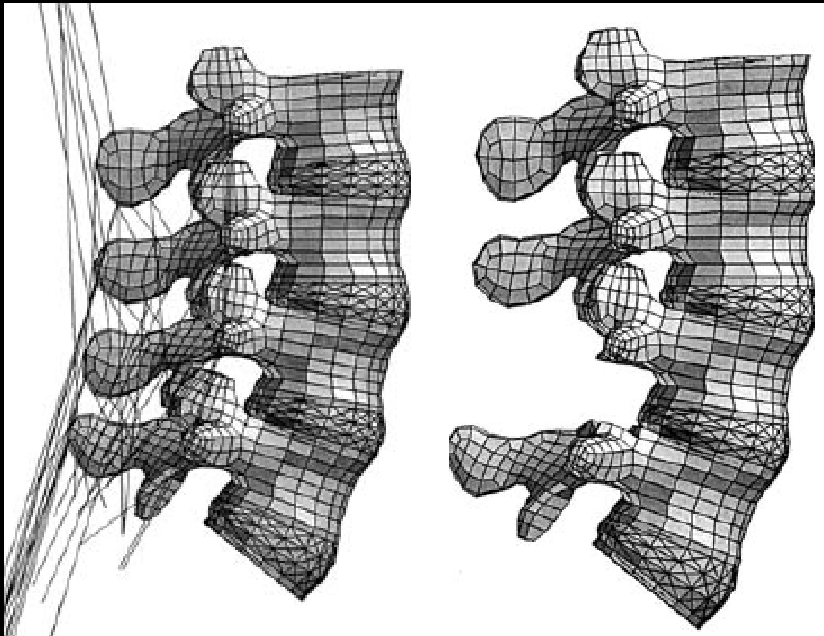
Neden Fasetektomi/Laminektomi Sonrası İnstabilite ?

Eur Spine J (2003) 12 : 427–434
DOI 10.1007/s00586-003-0540-0

ORIGINAL ARTICLE

T. Zander
A. Rohlmann
C. Klöckner
G. Bergmann

Influence of graded facetectomy and laminectomy on spinal biomechanics



- Tek taraflı hemifasetektomi aksiyal rotasyonda stabiliteyi azaltıyor.
- Tek seviye laminektomi fleksiyon sırasında, iki seviye laminektomi ayaktayken stabiliteyi azaltıyor.

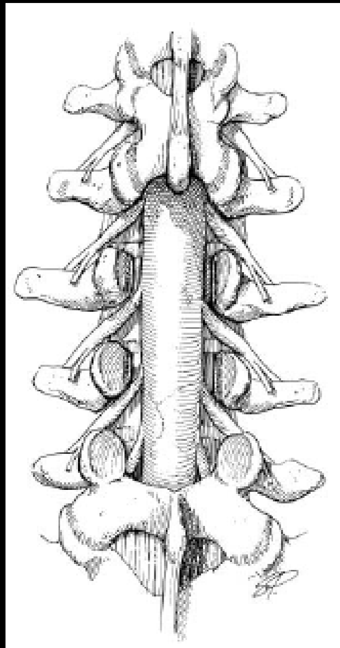
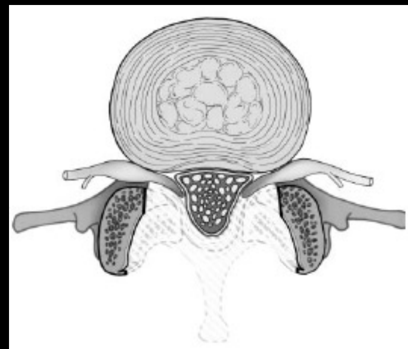
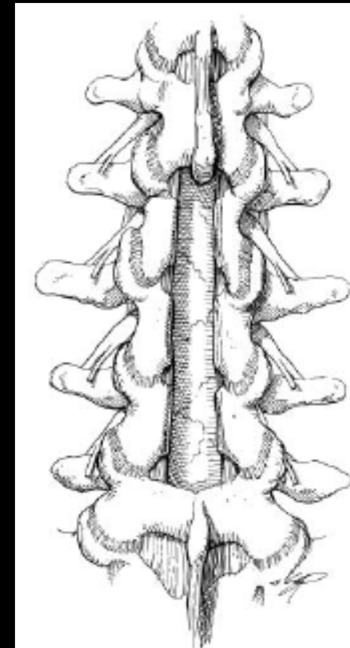
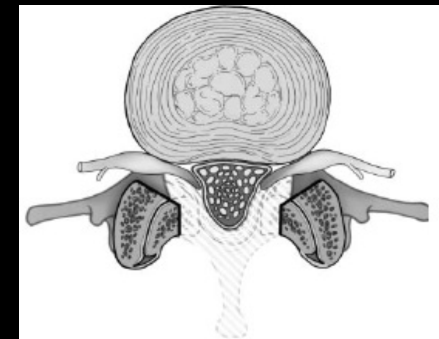
Neden Fasetektomi/Laminektomi Sonrası İnstabilite ?

J Neurosurg (Spine 2) 99:214–220, 2003

Biomechanical comparison of facet-sparing laminectomy and Christmas tree laminectomy

PAUL W. DETWILER, M.S., M.D., CHRISTINA B. SPETZLER, B.A., SARA B. TAYLOR, B.A., NEIL R. CRAWFORD, PH.D., RANDALL W. PORTER, M.D., AND VOLKER K. H. SONNTAG, M.D.

Compared with the intact condition, CTL-treated specimens had significantly larger increases in angular motion during flexion, lateral bending, and axial rotation than their FSL-treated counterparts ($p < 0.05$, nonpaired Student t-tests). Subsequent discectomy caused greater increases in motion in the CTL group. Axes of rotation shifted less from their normal positions after FSL than after CTL.

Olgu

64 yaşında erkek hasta
N. klodikasyon (+)
Sol bacakta radikuler ağrı
Sol dorsofleksiyon zaafı (3/5)

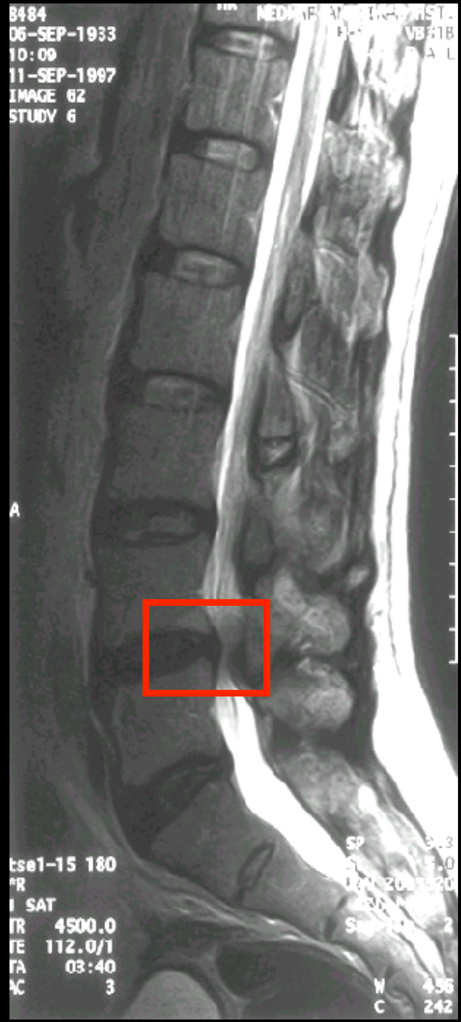

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IMAGE 62
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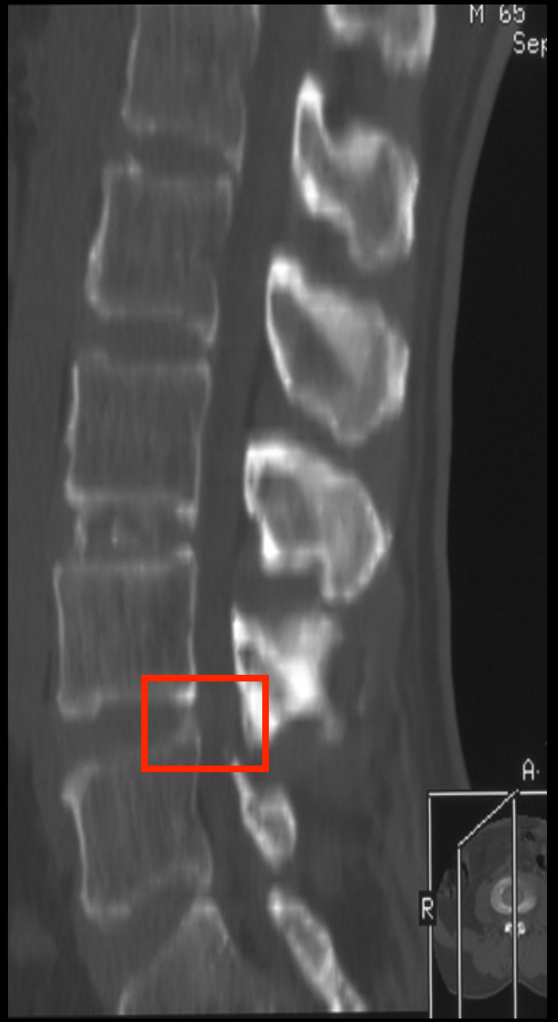
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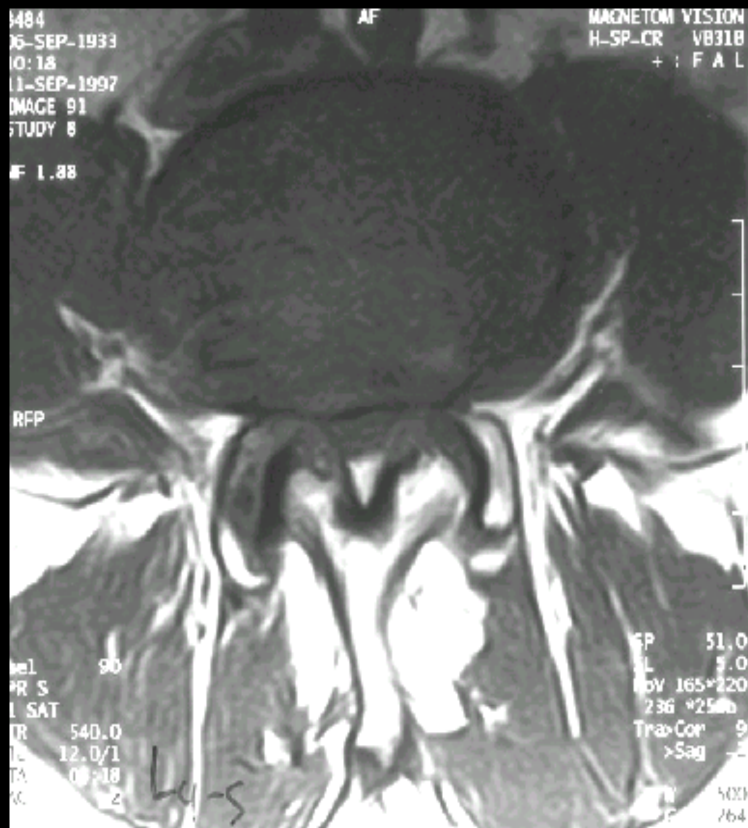
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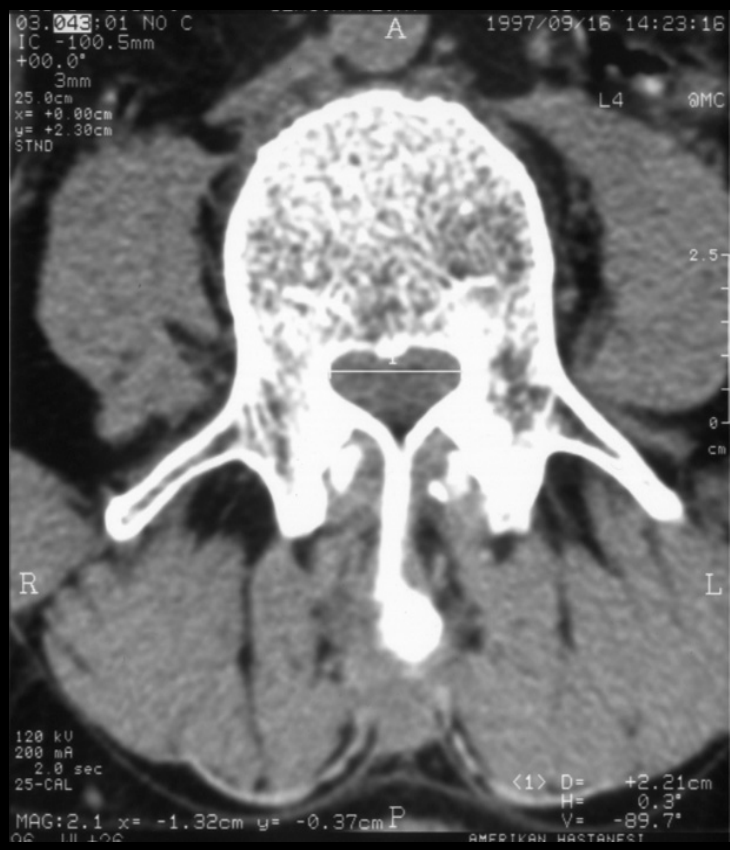
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y= +2.30cm
STND
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2.5
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cm
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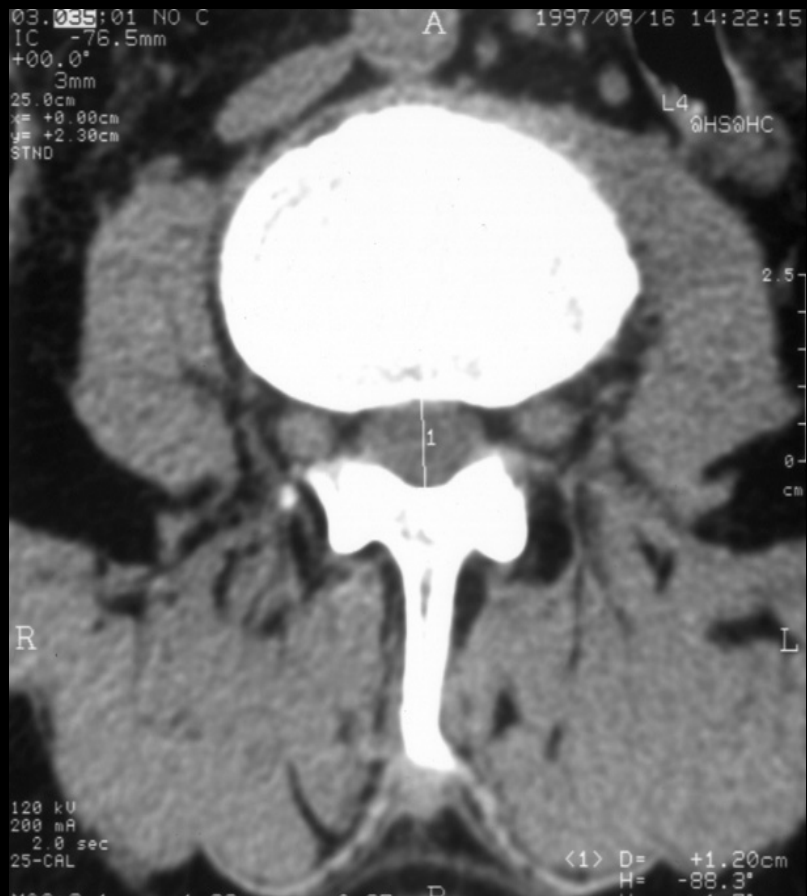
L
120 kV
200 mA
2.0 sec
25-CAL
<1> D= +2.21cm
H= 0.3°
V= -89.7°
MAG:2.1 x= -1.32cm y= -0.37cm
P
AMERIKAN HASTANESI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y= +2.30cm
STND
L4
@HS@HC
2.5
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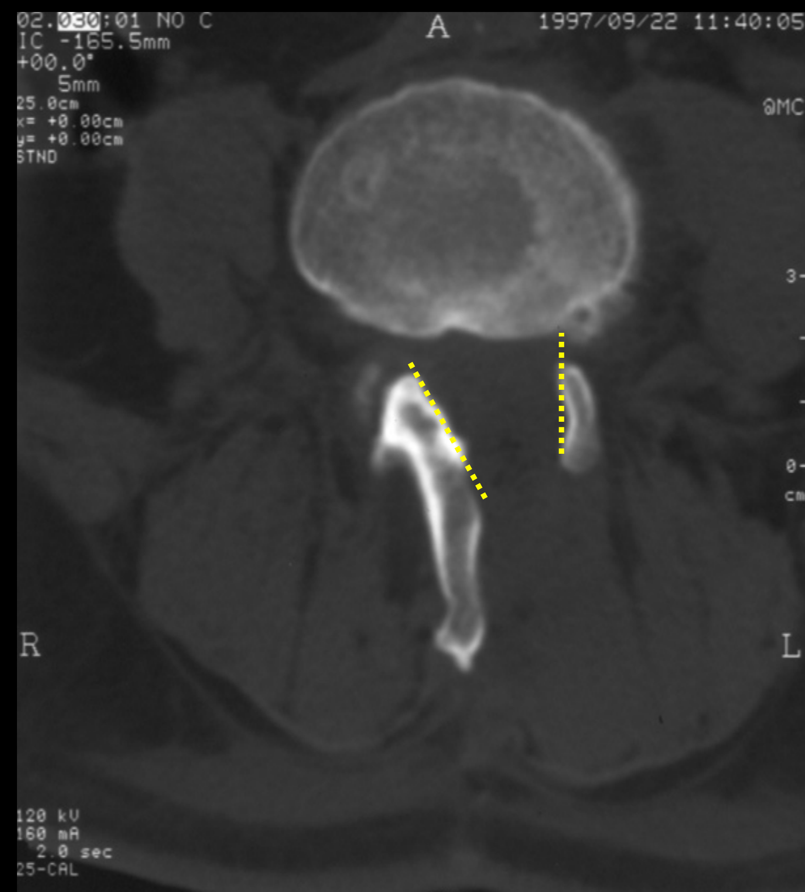
cm
R
L
120 kV
200 mA
2.0 sec
25-CAL
<1> D= +1.20cm
H= -88.3°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A
1997/09/22 11:40:05
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+00.0°
5mm
25.0cm
x= +0.00cm
y= +0.00cm
STND
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cm
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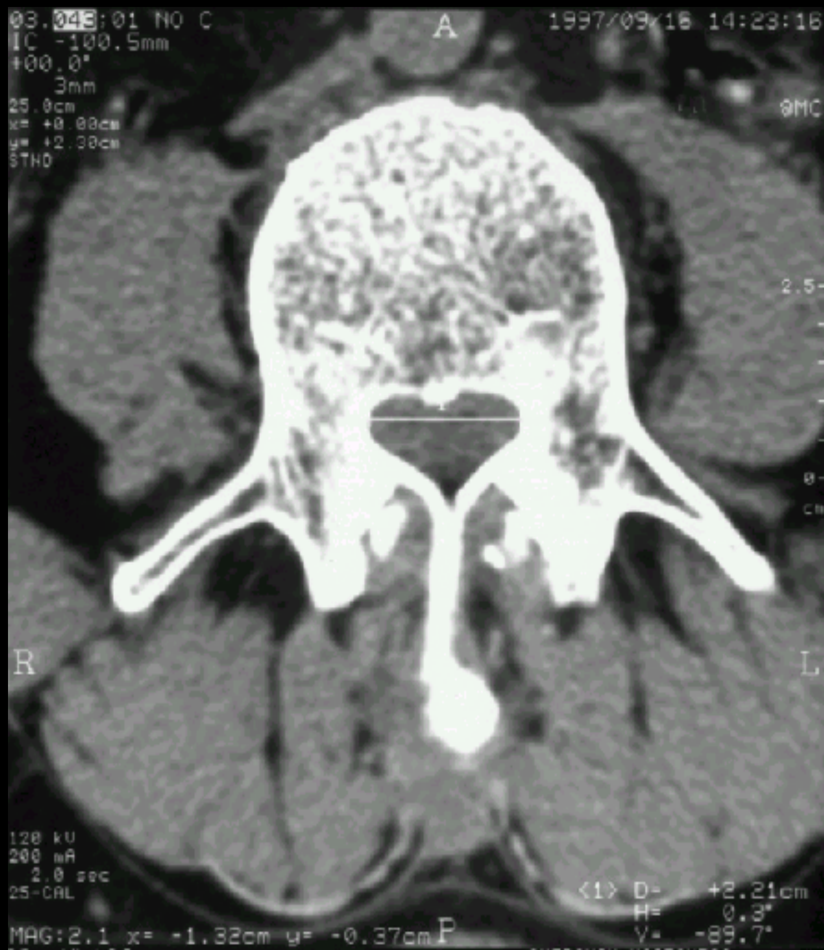
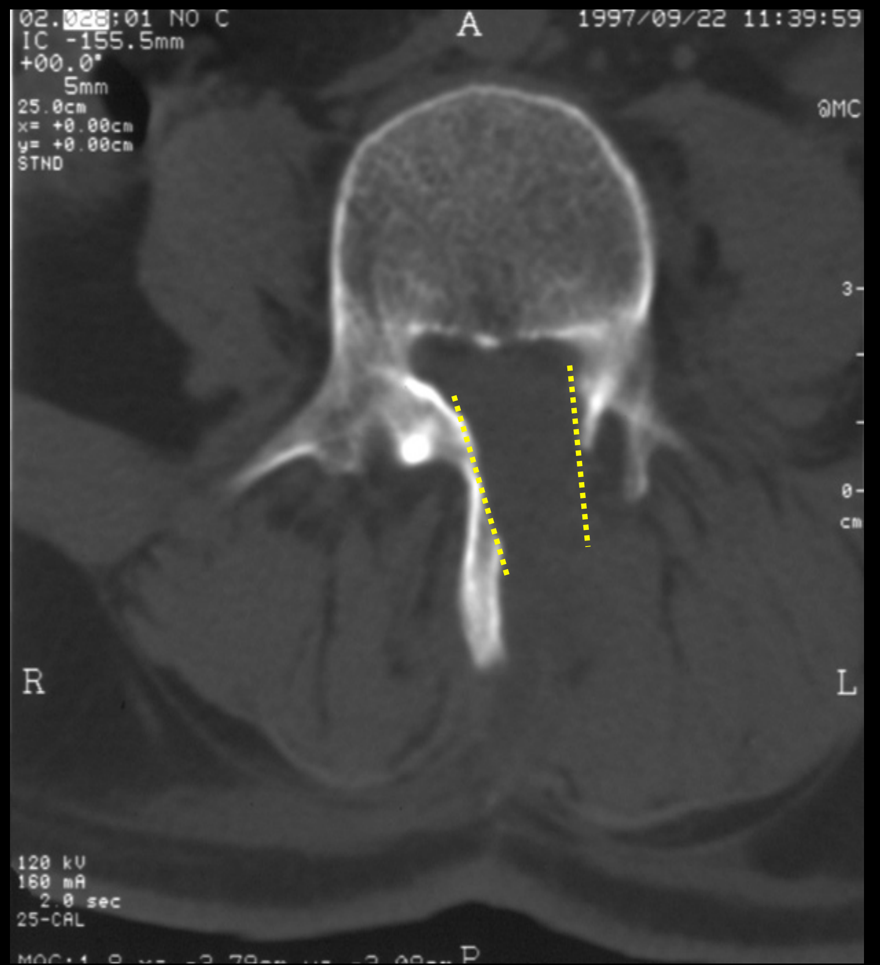
120 kV
160 mA
2.0 sec
25-CAL



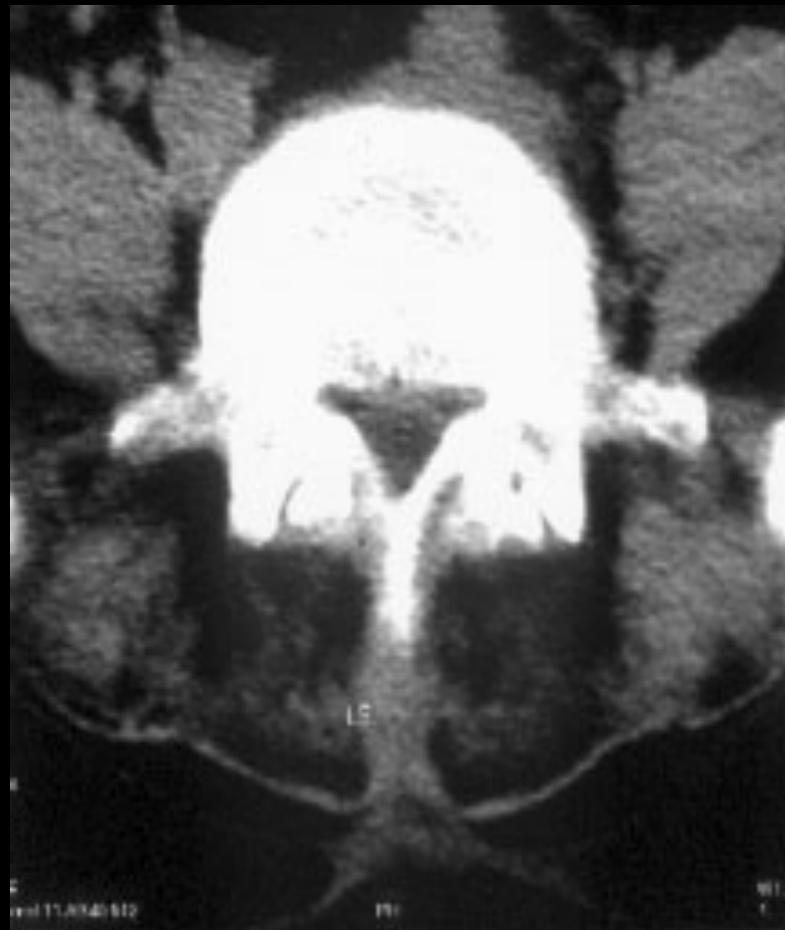
03.043:01 NO C
A
1997/09/16 14:23:16
IC -100.5mm
+00.0°
3mm
25.0cm
x= +0.00cm
y= +2.30cm
STND
@MC
2.5
0
cm
R
L
120 kV
200 mA
2.0 sec
25-CAL
<1> D= +2.21cm
H= 0.3°
V= -89.7°
MAG:2.1 x= -1.32cm y= -0.37cm
P

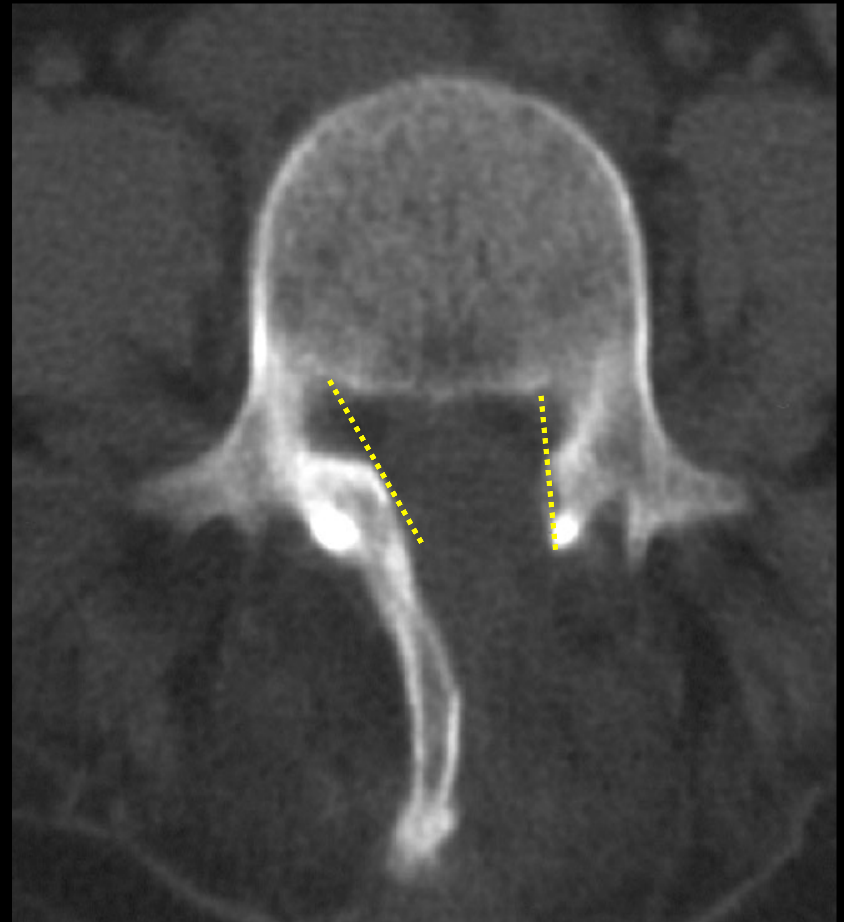


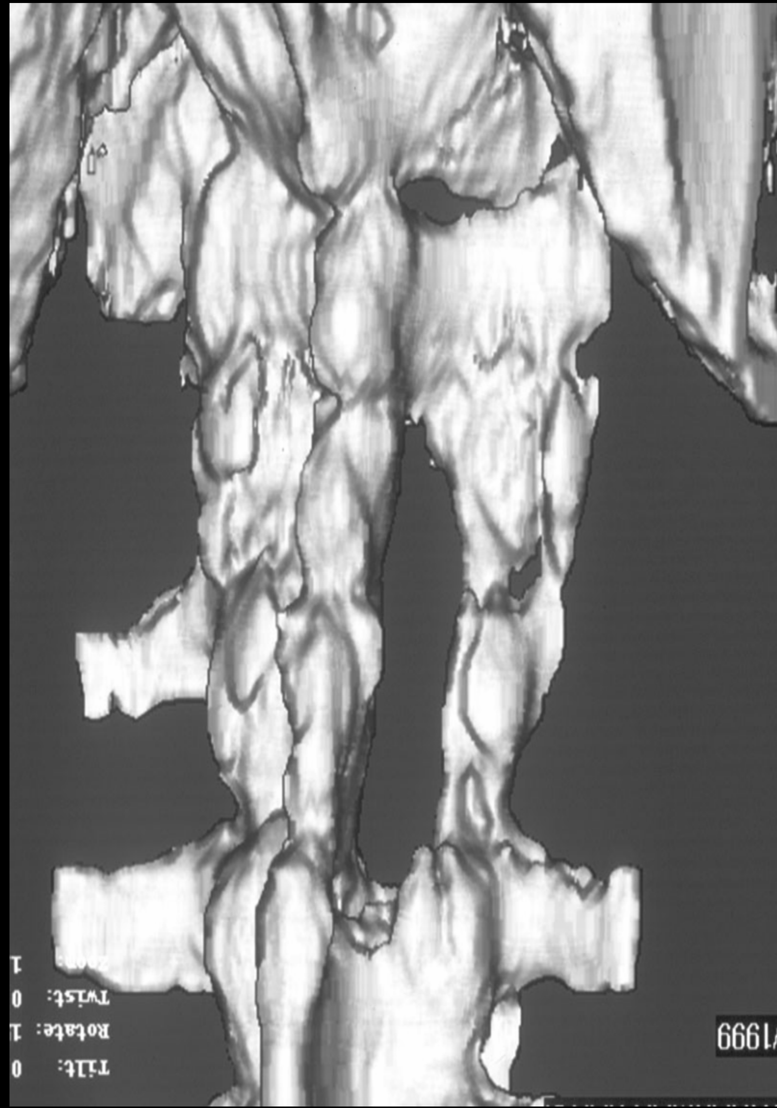
02.028:01 NO C
A
1997/09/22 11:39:59
IC -155.5mm
+00.0°
5mm
25.0cm
x= +0.00cm
y= +0.00cm
STND
@MC
3
0
cm
R
L
120 kV
160 mA
2.0 sec
25-CAL

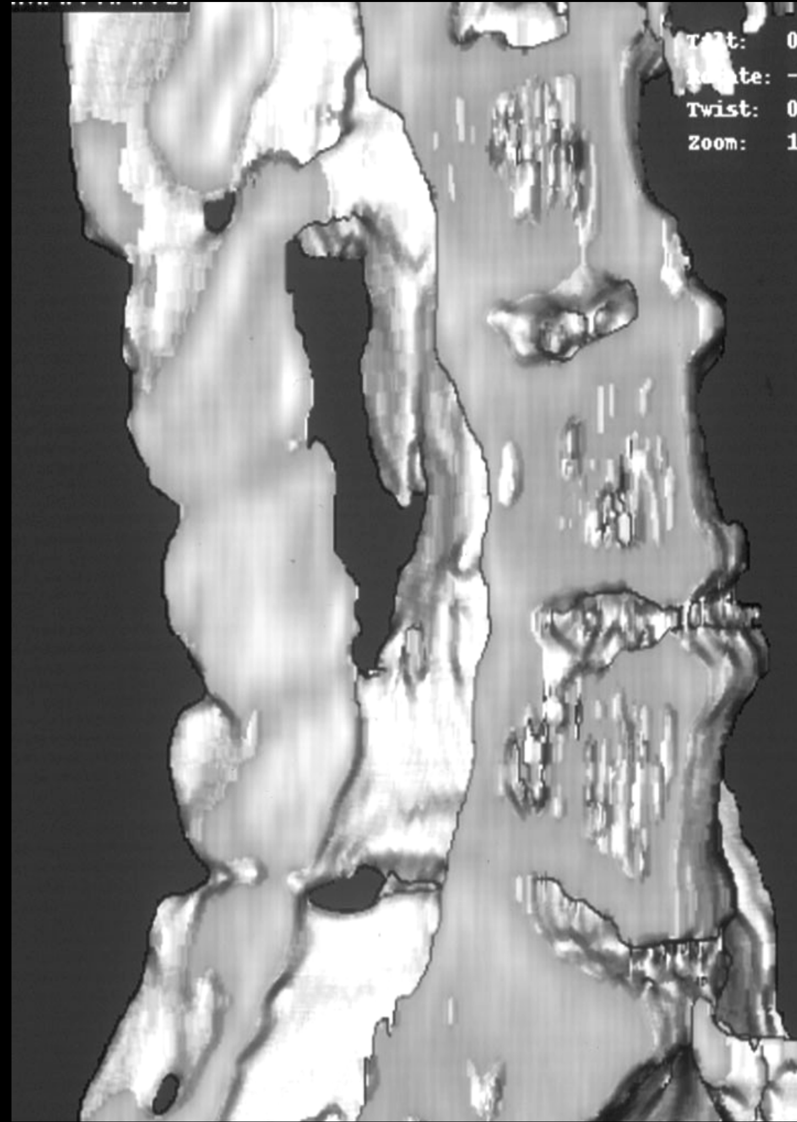
Olgu

76 yaşında erkek
N.klodikasyon (+)
Nörolojik defisit yok



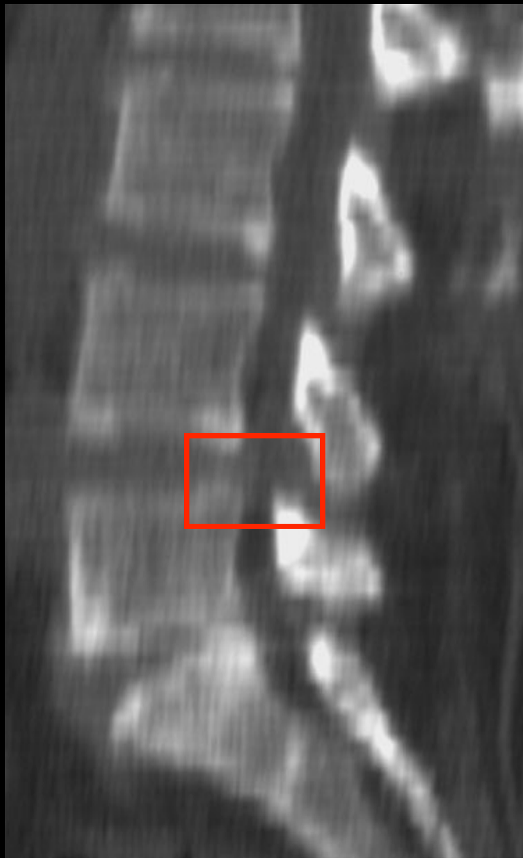


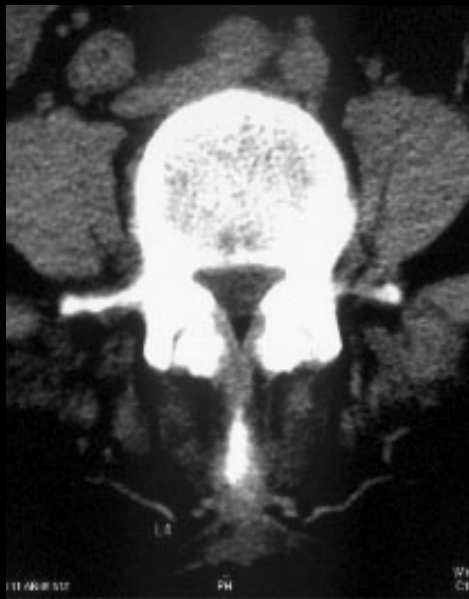

Twist: 0
Rotate: 1
Tilt: 0
/1999

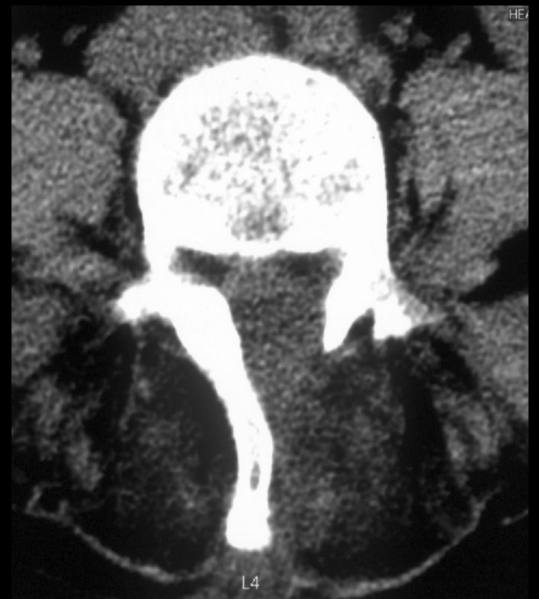

Twist: 0
Zoom: 1

Olgu

57 yaşında bayan hasta
N. klodikasyon (+)
Nörolojik defisit yok

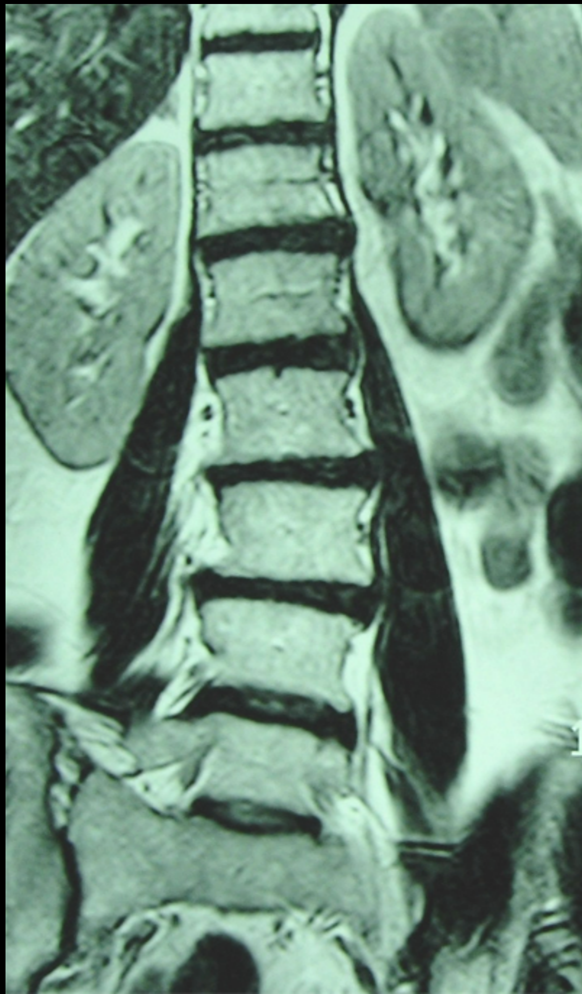
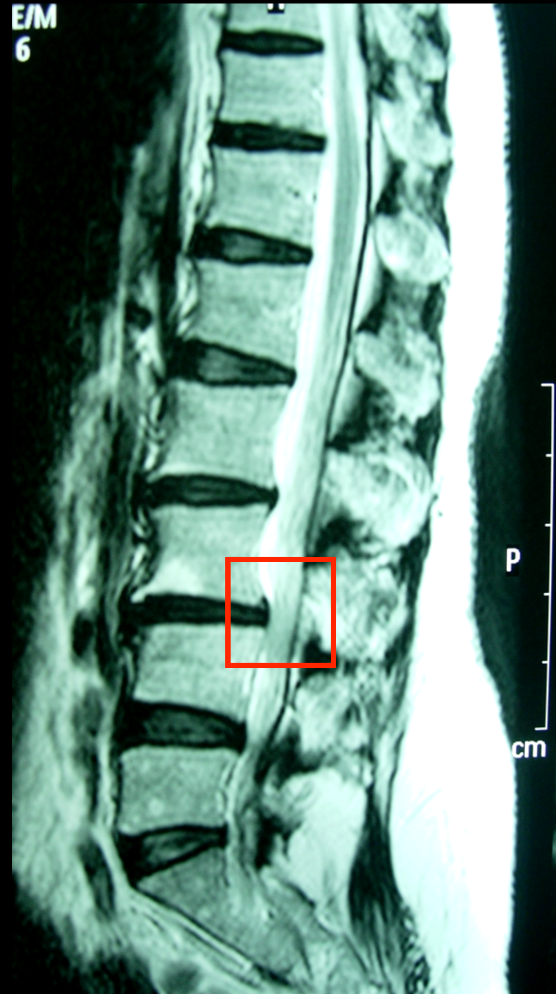
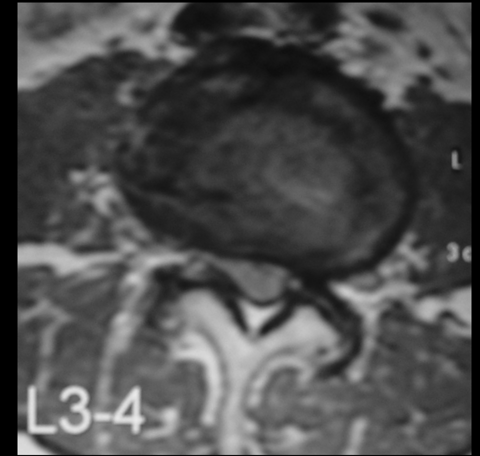
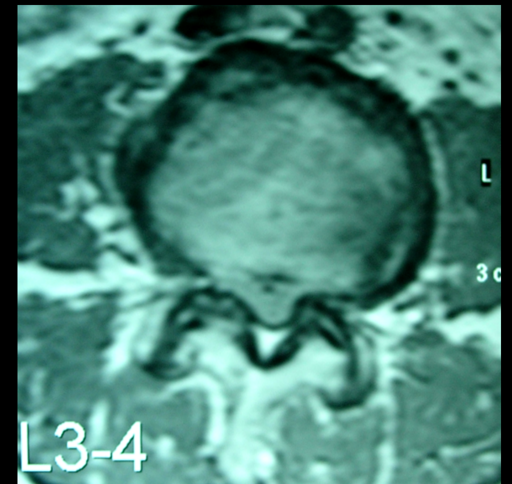


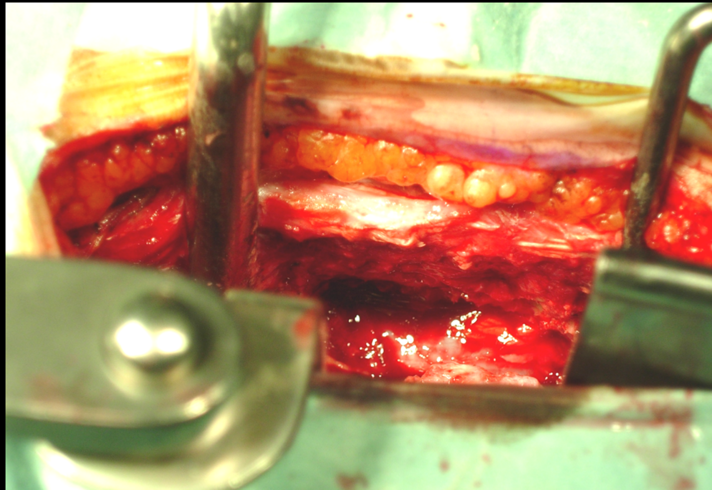
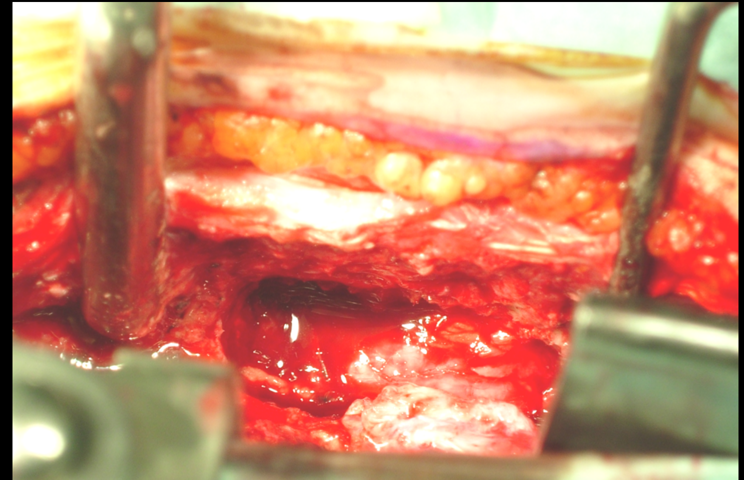

L4

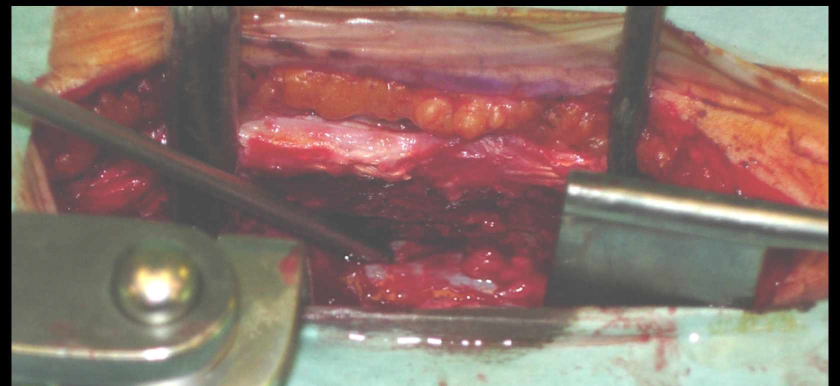

L4

Olgu

67 yaşında bayan
N. klodikasyon (+)
Sol bacak radikular ağrı
Sol diz ekstansiyonu 3/5



E/M
6
P
cm

L3-4
L

L3-4
L



Dekompresif Laminektominin Dezavantajı

Listezis (özellikle operasyon seviyesinde statik sagittal listezis)

Füzyon ve/ veya enstrumantasyon gerekliliği

Postlaminektomi alanında geniş fibrozis

Geniş alanda paravertebral adale atrofisi

Mikro-Hemilaminektominin Avantajı

Radikuler kliniğin ağırlıklı olduğu taraftan yaklaşım (sağ veya sol)

Mikroskop açısıyla karşı tarafı görebilmek

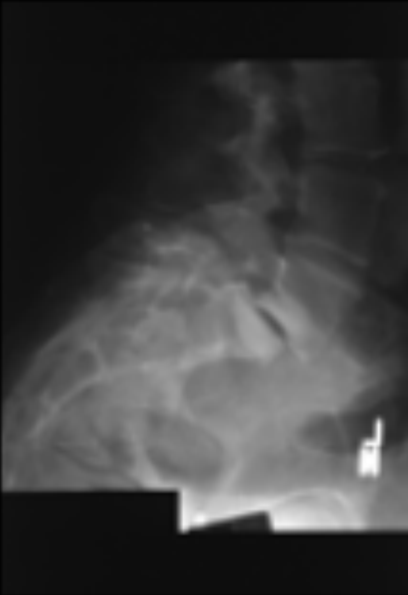
Daha az kemik dokusunun rezeksiyonu ve stabilitenin korunması

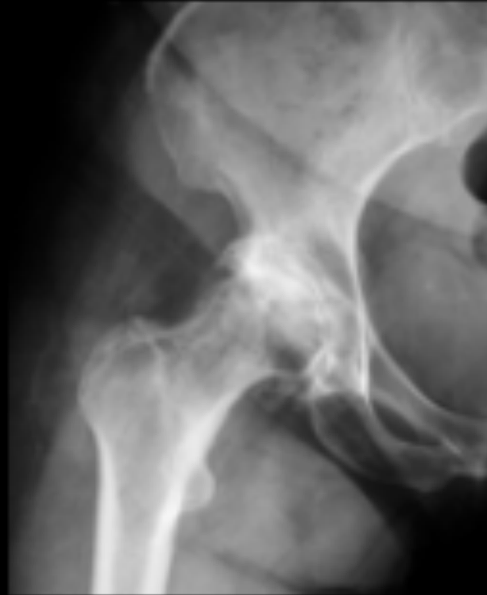
Daha az fibrozis ve listezis

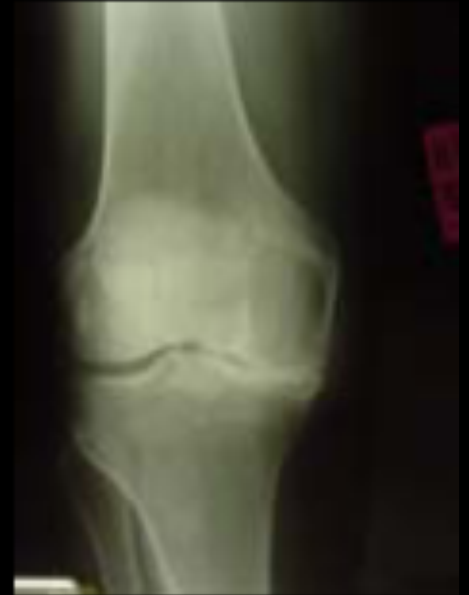
Erken mobilizasyon

Sonuç

Lomber dar kanalı olan seçilmiş olgularda mikroskop altında tek taraflı hemilaminektomi ile yeterli dekompresyon sağlamak mümkündür.







Teşekkür Ederim