

척추 시술의 적절한 적용 및 치료 전략

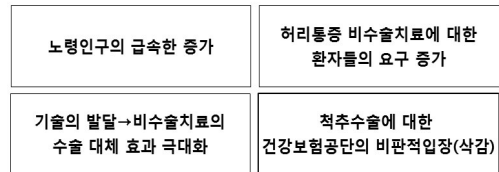
조 보 영
연세바른병원

<연도별 주요수술 진료비용 추이>

(단위 : 백만원)

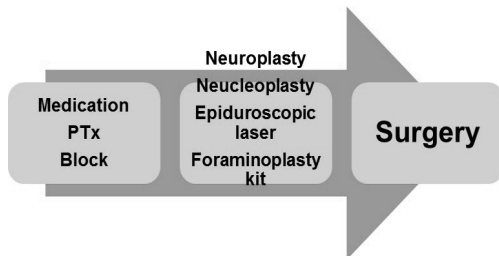
구분	2006	2007	2008	2009	2010	2011
총액(33개 주요수술)	2,471,652	2,615,635	2,891,796	3,491,325	3,765,308	3,727,781
1 일반 척추수술	296,005	345,809	366,658	446,456	496,279	484,437
2 핵박출 수술	265,456	302,684	337,068	371,391	404,240	439,236
3 슬관절 치환술	212,671	268,015	291,162	345,817	397,231	376,630
4 스텔트 삽입술	240,808	277,639	289,247	322,016	354,078	381,349
5 계양절개수술	143,724	171,125	178,900	178,625	196,591	202,934
6 장수절제술	121,078	137,731	138,701	178,296	191,194	191,807
7 지적수술	182,281	189,750	191,991	205,968	199,270	187,392
8 탈장절제술(내시경전 탈장절제술)	84,434	99,382	103,443	137,469	173,265	183,083
9 신경성 심장기형 수술	70,768	74,721	73,008	109,998	127,914	167,318
10 간체절제술	91,318	100,343	106,580	134,353	148,416	135,961
11 내시경 및 경피적 담도수술	66,243	76,900	84,299	102,894	121,723	124,072
12 자궁절제술	154,113	168,335	173,319	196,312	167,799	120,187
13 위절제술(2차 질환에 의한 수술 포함)	83,799	92,773	86,409	113,560	120,133	119,442
14 강상선 수술(2차 질환에 의한 수술포함)	36,581	47,625	34,869	72,217	80,505	86,941
15 관상동맥우회수술	43,320	45,906	47,698	61,316	68,413	65,845
16 고관절 치환술	50,991	56,119	57,677	62,114	67,410	64,625
17 내시경전 부비동 수술	-	-	-	41,928	51,783	54,820
18 전방분 절제술(2차 질환에 의한 수술 포함)	27,704	31,993	33,104	46,694	51,477	33,226
19 뇌종양 수술	32,576	36,989	34,193	47,042	51,295	49,883
20 흉방절제술	16,785	17,401	18,569	47,348	44,880	46,561

주) 1. 총액은 2011년 수술진료비 기준
2. 신경성 심장기형 수술 코드 변동으로 증가율 순위를 제외



척추 비수술 치료증가

Treatment of LBP & Radicular pain



Emerging Tx of Spinal disease

1~3세대 비수술 적주치료	4세대 비수술 적주 치료
I 1세대 : 견인치료, 전기자극, 물리/도수치료 등 I 2세대 : 주사치료 I 3세대 : 신경성형술 등 병변 접근 시도	I 4세대 : 최신 장비 + 의료 기술 + 임상 노하우 축적 : 비수술 치료로 수술 효과 : 환자 편의 증대
수술에 대한 막연한 두려움 주변의 수술 유행 권유 → 어쩔 수 없는 비수술 선택	수술만큼의 치료 효과 수술 대체 비수술 치료 → 능동적, 적극적인 비수술치료 선택

Epiduroscopic Procedure SELD, TELA

1. 작은 직경(1 ~ 3mm)의 정밀 내시경 활용

- 진단과 치료를 동시에
- 정교하고 정확한 비수술 치료
- 출혈, 내부조직 손상 최소화 치료

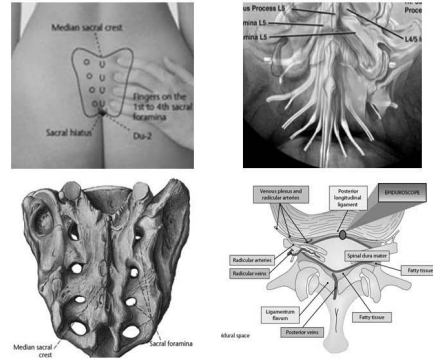
2. 치료 기술력

- 척추 구조변화나 주변조직 영향이 적은 치료
- 환자 본인의 척추관절을 최대한 유지시켜 치료
- 의료진의 수술, 비수술 임상 경험

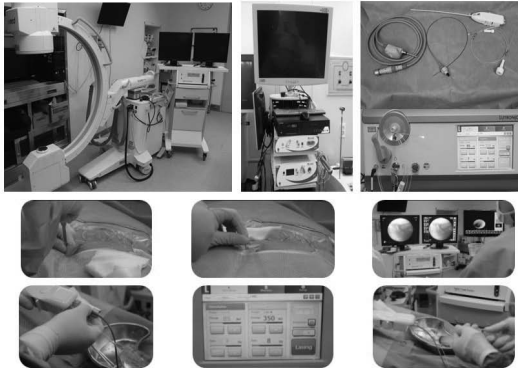
3. 환자 편의

- 회복과 재활 기간이 짧다
- 빠른 생활·업무 복구가 가능해 경제적 효과가 크다
- 척추 수술에 대한 환자들의 공포 해소

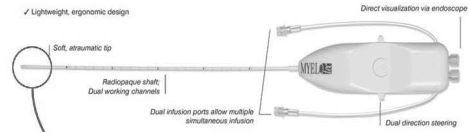
SELD – Approach to Epidural Space



Equipments

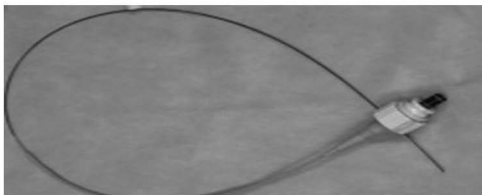


Epidural Catheter



- ✓ 3mm outer diameter
- ✓ Dual working channel: 1.3mm each
- ✓ Dual infusion ports

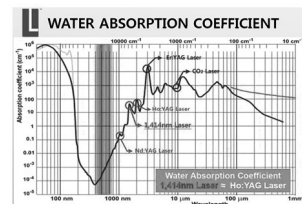
Epiduroscope Camera



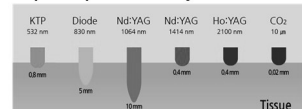
- 0.9mm outer diameter with 10k pixel fiber bundle
- Approximately 40 X magnification, depending on the eyepiece coupler and the video system
- 80° field of view; 0° angle of view
- 76cm effective length
- For use with Surgiview camera system only

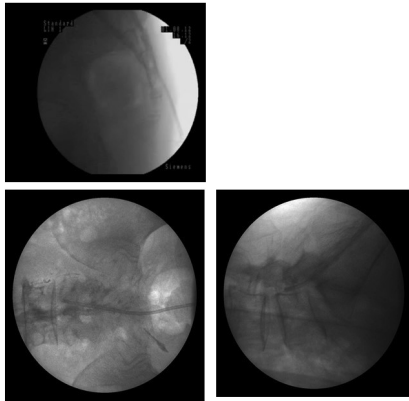
ND:YAG Laser

- High affinity for water at 1414nm of wavelength (NP contains 70~80% of water)
- Relatively small penetration depth: 0.4mm
- Gasification, ablation, dissection, hemostasis
- Heat generation: Minimal (Short TRT)
- Laser power: 12 watt
 - Pulse rate: 1~20 Herz
 - Pulse Energy: max 600mJ



Depth of penetration by laser





Action Mechanism

- Direct neural decompression with laser gasification of HNP
- Making extrusion provoke gradual absorption of HNP
- Destruction of ingrown nerve at the annulus (Sinu-vertebral N.)
- Epidural mechanical adhesiolysis
- Irrigation of pain provoking chemical agents

Study Design

Purpose

- To investigate the effectiveness of epiduroscopic laser ablation for **acute uncontrollable radiating pain** with or without LBP
- Ruptured HNP, recurred HNP, discal cyst, and facet cyst, L-stenosis, PSSS
- Analysis : Ruptured HNP
 - VAS & MacNab's criteria at **POD 1wk , 3 months**

Study Design

Materials & Methods

- 2013. 1 – 2015. 4
- Total 321 patients
- 229 ruptured HNP was included.

	No. of Pt.	Open	rate(%)
Ruptured HNP	229	35	15.3 %
Recurred HNP	25	6	24.0 %
Discal cyst	1	0	0 %
Facet cyst	9	1	11.1 %
L-stenosis	41	7	17.1 %
Postop pain synd.	16	0	0 %
	321	49	15.3 %

Study Design

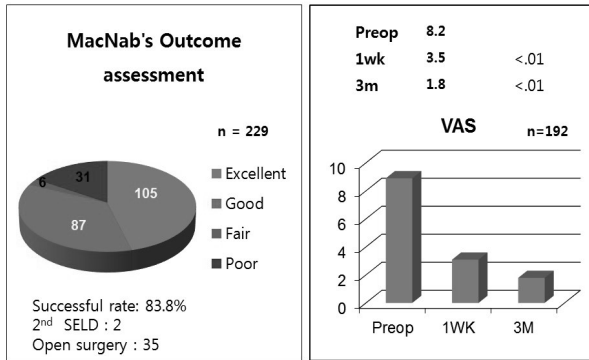
Materials & Methods

▪Inclusion criteria

- Uncontrolled pain although conservative Tx
- Acute ruptured lumbar disc (contained or extruded) regardless of size of herniation
- No hard disc
- No motor weakness
- No severe spinal stenosis or spondylolisthesis

Demographic and Clinical feature		
Gender (number of patients)	Male	134
	Female	95
	Total	229
Lesion (number of patients)	L2-3	5
	L3-4	29
	L4-5	103
	L5-S1	92
Mean duration of Symptom before operation (months)		1.26

Results



Poor Prognostic Factors

- Upward migration
- Lateral recess stenosis
- Catheter가 너무 base를 향한 경우
- Spondylosis (spur), retrolisthesis
- Scope의 해상도가 떨어진 경우

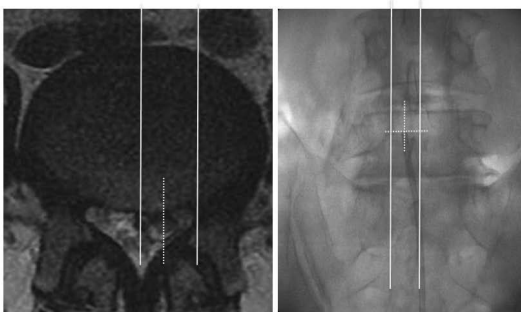
Possible Complications

Complication	N	%
Postoperative infection	1	0.4%
Motor weakness (may be laser thermal injury)	2	0.8%
Dural puncture	6	2.6%
Total	9	3.9%

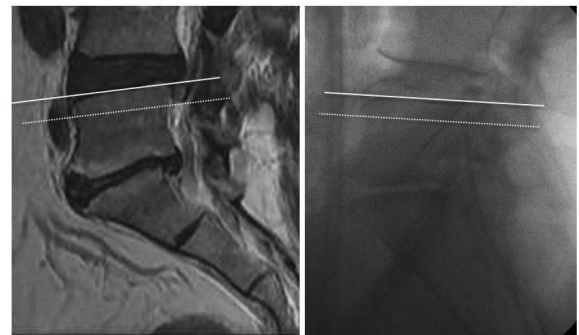
Technical tip

- Accurate preop 3D measuring for targeting **center of herniation**
- Confirm of epidural space on epidurogram
- Verification of disc and dura on epiduroscope
- **Check position of laser tip**
- Check Sx relief & Heating sense

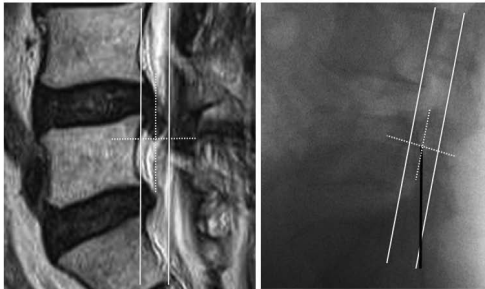
Center to lateral



Down migrated

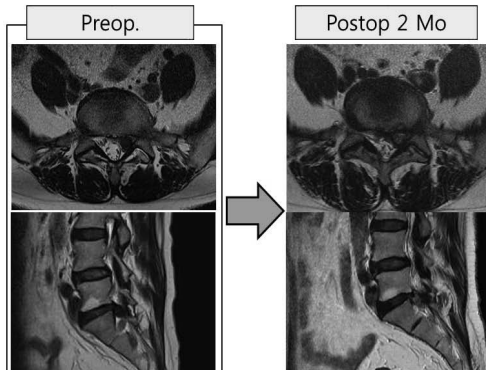


Ventral to dorsal

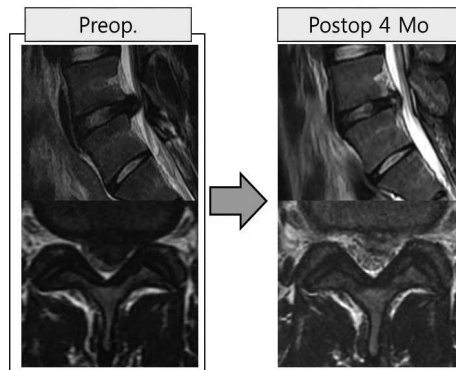


Good Cases

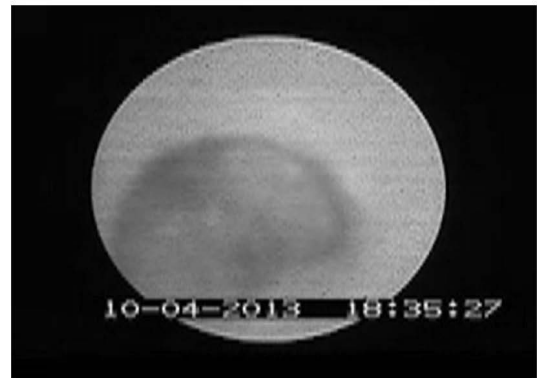
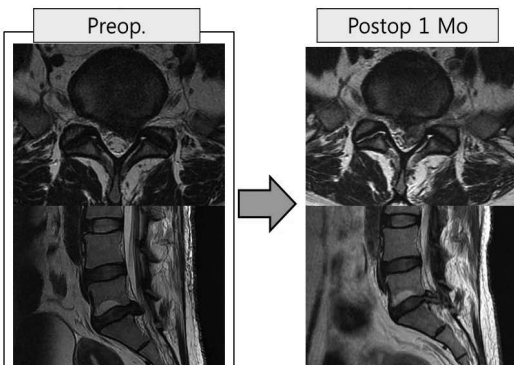
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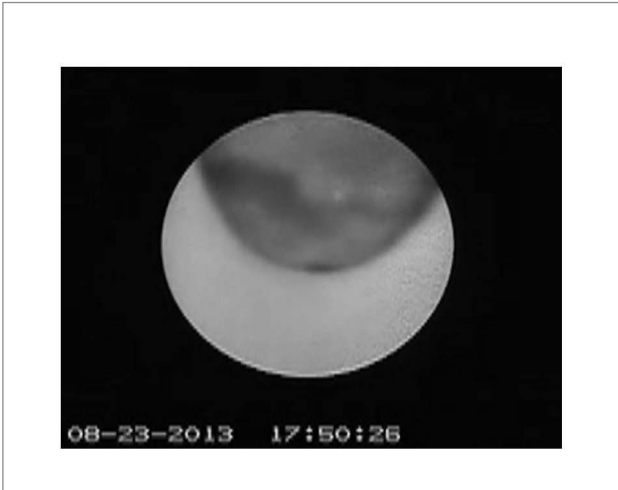


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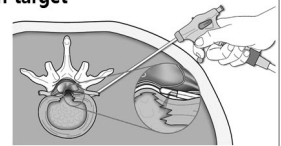
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TELA Transforaminal Endoscopic Laser Annuloplasty

- Transforaminal : short path to target
- Epidural Extradiscal : outer 1/3, risk of nerve injury
- Visibility : Disposable Unit
- Small diameter Unit 3.75mm
- High Energy to herniated tissue
: side firing laser
- Control and touch down on target
: Flexible



Clinical study

- Total 23 patients
- 2014. 11 ~ 2014. 12
- Unresponsive to sufficient period of conservative treatment (medications, PTx, block)
- Contained or extruded HNP or annular tear on MRI
- Exclusion
 - Neural deficit
 - Severe stenosis of spinal canal or neural foramen
 - Migration : upward or downward
- Outcome
 - VAS pain scale : pre & post op
 - Modified MacNab criteria

Diagnosis	Sex / Age	OP level	C/C	Outcome(3m)
HNP, recur.ext	M / 68	4/5	Leg pain	Excellent
HNP, Prot	M / 57	4/5	Leg pain/LBP	Excellent
DDD	M / 55	2/3	LBP/leg pain	Fair
DDD	F / 64	4/5	LBP/leg pain	Fair
DDD, AntT	F / 54	4/5	LBP/leg pain	Good
DDD, AntT	F / 46	4/5	LBP/leg pain	Good
HNP, AntT	M / 28	2/3/4	Leg pain/LBP	Good
HNP, Prot	M / 36	4/5	Leg pain	Excellent
DDD, Ant	M / 63	4/5	Leg pain/LBP	Excellent
HNP, centext	M / 62	1/2	Leg pain/LBP	Poor
DDD	F / 54	4/5	LBP	Good
HNP, prot	F / 46	4/5	LBP/Leg pain	Good
HNP,paracentext	M /48	4/5	Leg pain/LBP	Excellent
HNP, prot	F / 51	4/5	LBP/leg pain	Good
HNP, prot	M/42	4/5	Leg pain/LBP	Good
HNP,fora.ext	M/40	4/5	Leg pain/LBP	Excellent
HNP, fora.ext	M/54	4/5	Leg pain	Excellent
DDD	M /58	4/5	LBP	Good
DDD,seg inst	F / 51	4/5	LBP/leg pain	Good
HNP, centext	M/65	3/4	LBP/leg pain	Good
HNP, prot	F/30	5/51	Leg pain/LBP	Poor
HNP, paracentral	M /46	4/5	Leg pain/LBP	Poor
HNP,paracentext	F/67	2/3	Leg pain/LBP	Excellent

Demographics & Outcomes

- No of Pts : 23
male : 14 female : 9
- Age : 28 ~ 68 yrs, Mean : 51.5

- DDD (w/wo annular tear) : 8
HNP (w/wo Extrusion) : 15

OP level

Level	L1/2	L2/3	L3/4	L4/5	L5/S1
No.	1	3	2	17	1

Outcomes

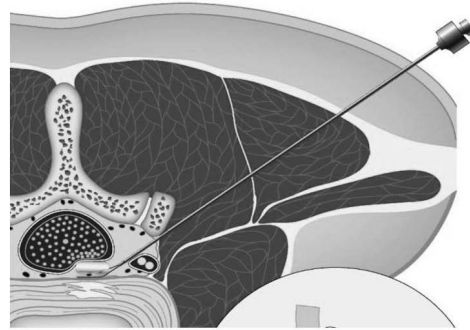
Excellent	Good	Fair	Poor
8	10	2	3

- Success rate (Excellent + good) : 78 %

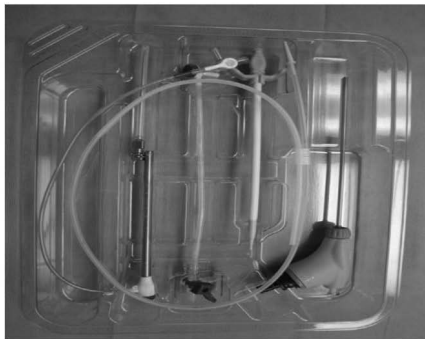




Approach



Equipments



Indications

- **Discogenic LBP w/wo leg pain :**
 - 1) Annular disruption-induced pain
→ Annuloplasty → TELA
 - 2) Endplate disruption-induced pain
- **HNP**
 - 1) Extraforaminal & foraminal
 - 2) Paracentral & central
 - 3) Recurrent
- **FBSS with perineural adhesion & discal cyst**

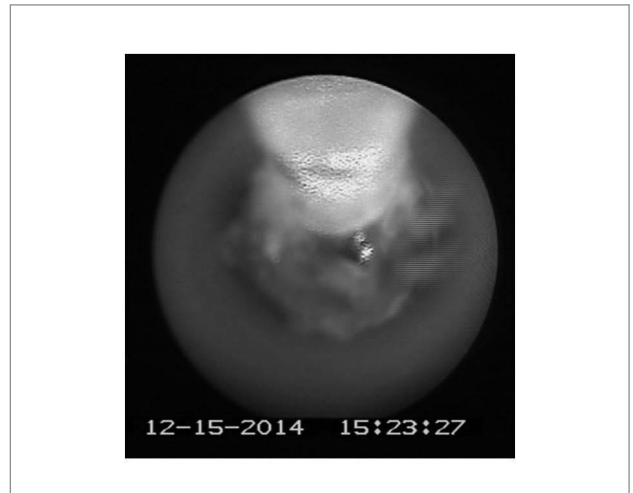
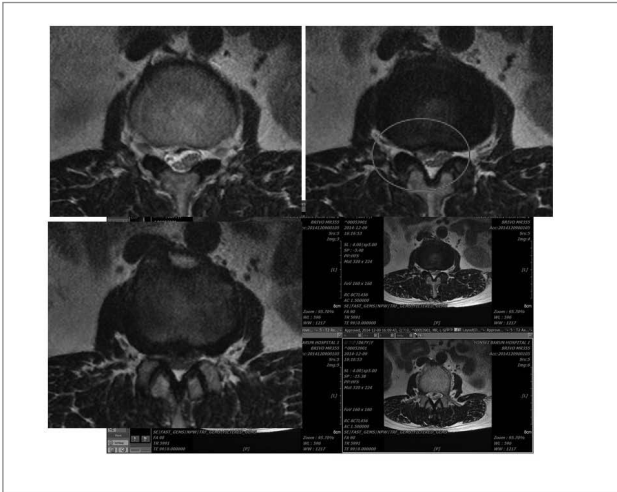
Contraindications :

Predictors of poor outcome

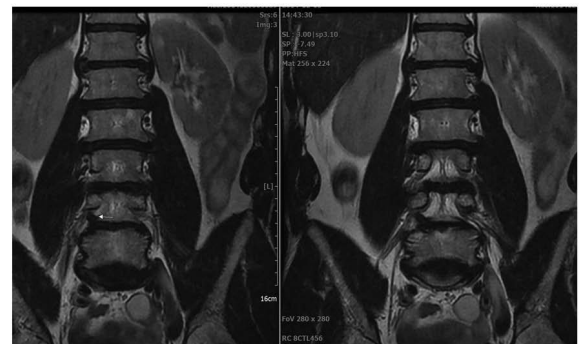
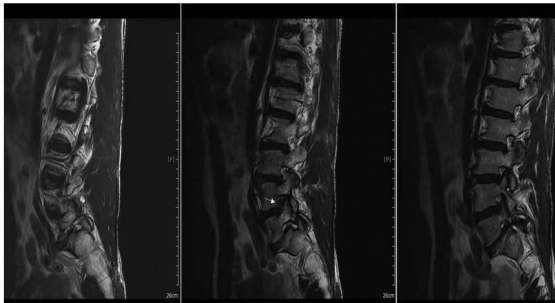
- **Hard & calcified HNP**
→ Confirmed by CT
- **Severe stenosis of neural foramen or canal**
- **Segmental instability**
- **DDD with modic change**

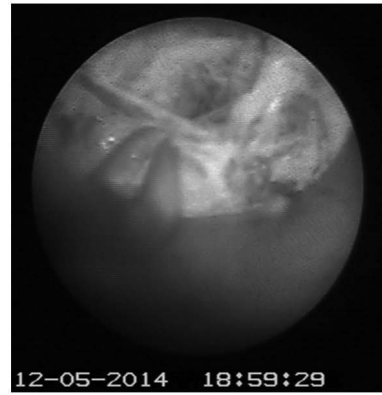
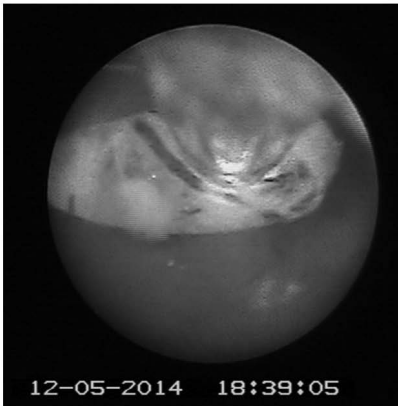
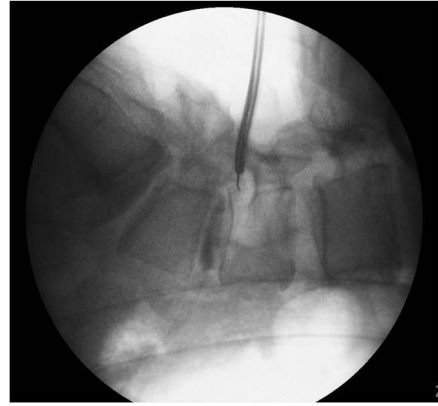
Two directions of laser firing

- 1. Side firing laser :**
 - 1) Outside raining of laser
→ low power laser, annular shrinkage
 - 2) Internal rotation of laser
→ Large ruptured disc particle, debulking
- 2. Direct firing laser :**
 - 1) large ruptured disc particle, debulking



Foraminal disk rupture L4/5 R, M54
Radiating pain to leg





Goal of non-surgical Tx

