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Percutaneous endoscopic discectomy in adolescent lumbar disc herniation

A CASE REPORT

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Adolescent Lumbar Disc Herniation

Lumbar disc herniation (LDH) in children and adolescents is rare, representing 0.5% to 3% of all herniations

Because conservative treatment is not as effective for pediatric LDH as it is for adult LDH in pediatric patients with neurological deficits responding poorly to conservative treatment should undergo surgical procedures.

Surgical modalities comprise conventional open discectomy, microsurgical discectomy (MD) and percutaneous endoscopic discectomy (PED)

The optimal choice is controversial due to the rarity of this disease.

Adolescent Lumbar Disc Herniation

COD may offer sufficient posterior decompression through one-sided laminotomy

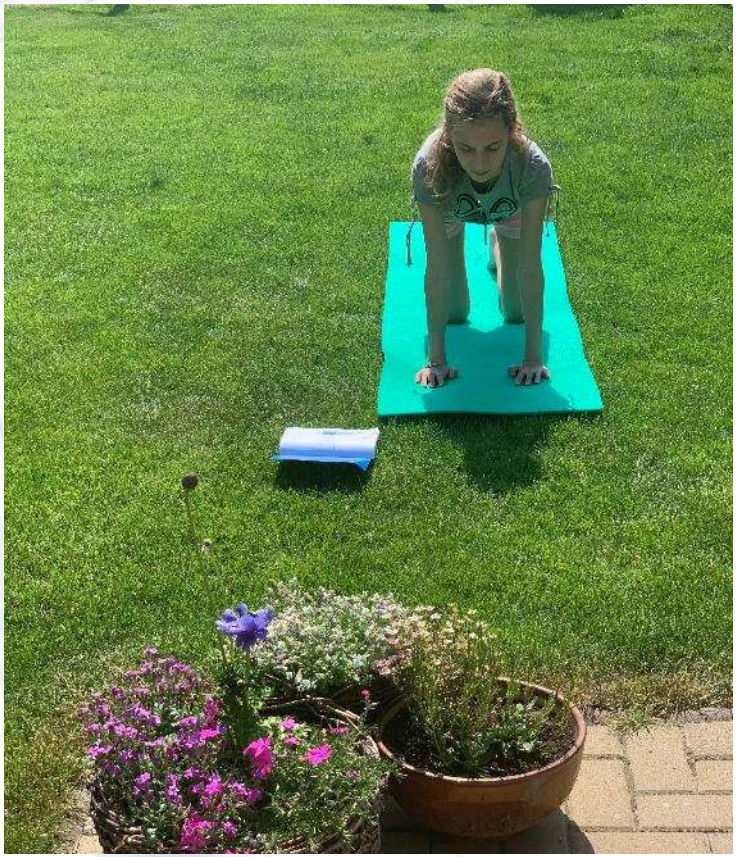
Transforaminal endoscopy offers direct acces to the herniation without any trauma of sorrounding structures

It is recognized that this disorder relates to various factors, including trauma or intensive sports activities, structural malformations of the spine, and hereditary factors

Pediatric LDH may be distinguished from adult LDH in that more adolescent patients exhibit movement limitation during the straight leg raise test (90%) than adults due to greater nerve root tension than in adults

A girl aged 11 - EPC clinic - April 2022

- Radicular pain in S1/L5 dermatoma, left lower extremity
- L5/S1 paramedian extrusion to the left with S1 nerve root compression, gr III
- Clinical symptoms over 6 weeks with a deterioration tendency
- Initial motor and sensory deficit
- Continuous pain 24/7, worse at night
- SLT positive 20 degrees on the left side



Adolescent Lumbar Disc Herniation

The inclusion criteria for our surgery were as follows:

- MR and CT images demonstrating a soft herniated disc,
- Patient exhibiting radicular symptoms and/or back pain consistent with imaging presentation,
- Symptoms refractory to conservative treatment for at least 6 weeks or symptoms exceeding patient's tolerance. (the girl was unable attending the school, sleeping disorders because of pain)

Previous medical history

- **No trauma**, no co-morbities
- **Gained 20 cm in 6 months**
- **Referred** to neurosurgeon where
  no indication for surgery because of age

The girl and parents advised to visit our clinic in order to **discuss percutaneous endoscopy** as an alternative to open spine surgery…

Specifics of adolescent lumbar disc herniation

- LDH leading to pain in the low back and lower limbs **is rare in children**
- The characteristics of LDH in adolescents are a **soft protruded disc, no severe spinal degeneration**
- In some cases, a **concomitant degenerative process** and bony spur formation
- **Trauma** is considered the main etiology of pediatric LDH.
- Other risk factors for LDH include a **family history, high lumbar load**, and strenuous physical exertion
- One study showed that a **high number of hours spent sitting** significantly increased the prevalence of disc herniation

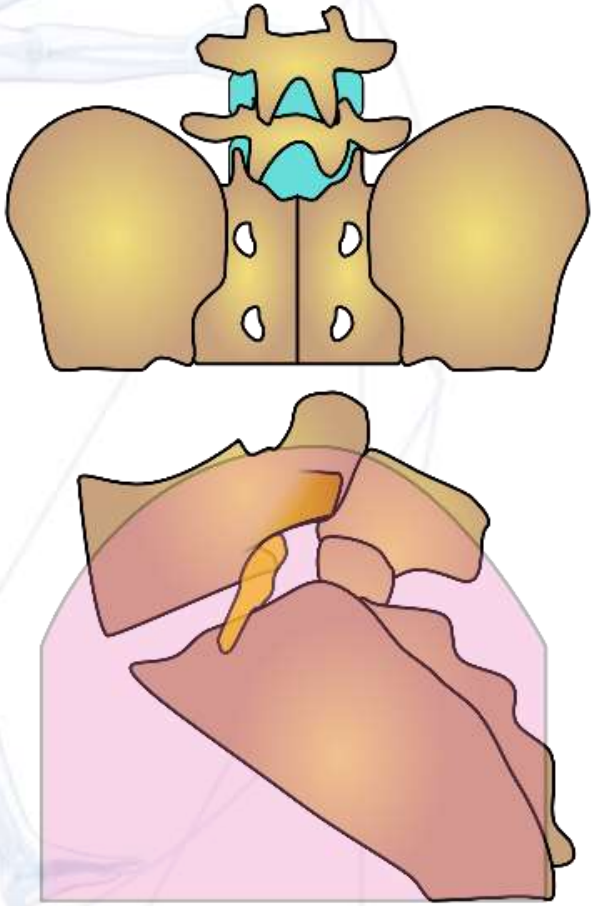
Specifics of adolescent lumbar disc surgery

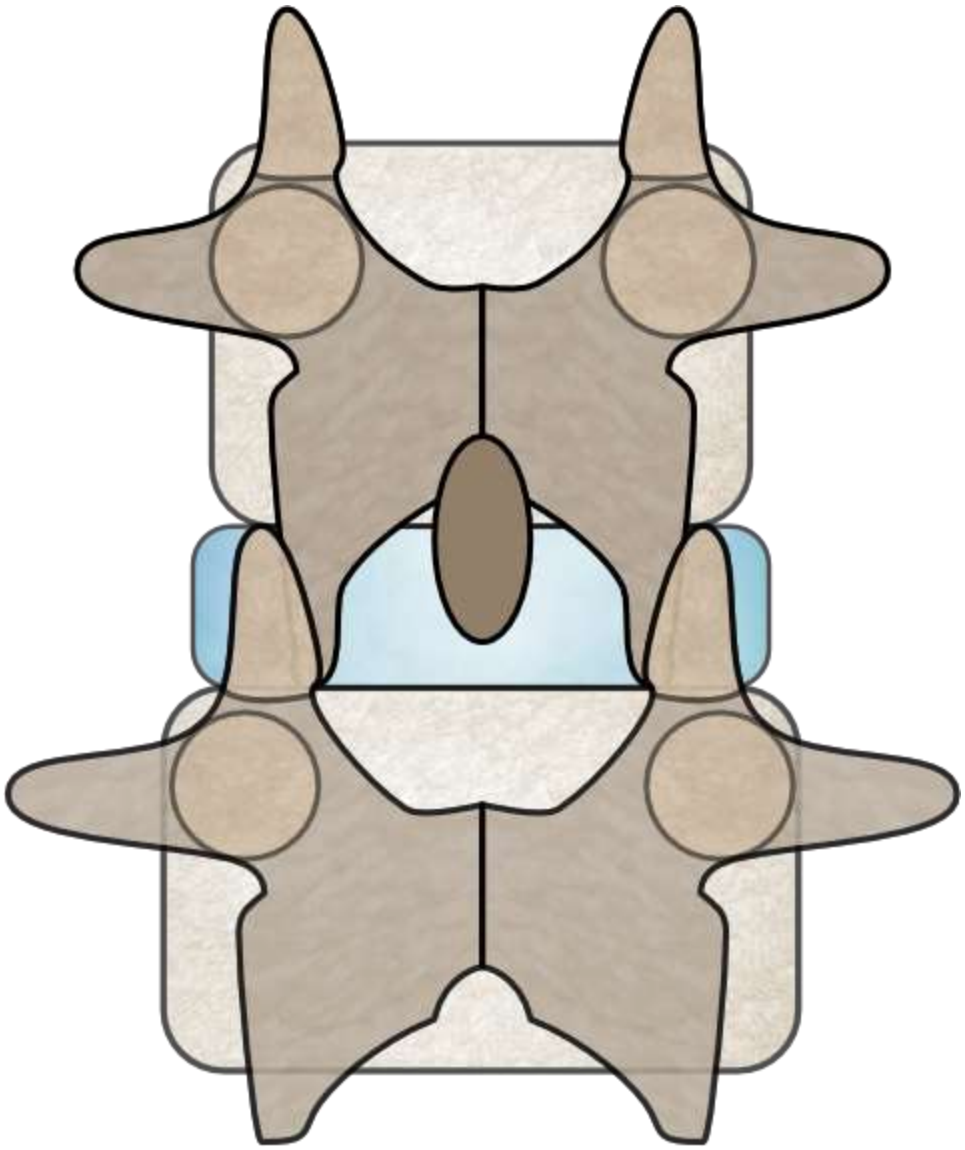
- PELD was performed under general anesthesia.
- The patient was placed prone on a radiolucent orthopedic surgery bed.
- A prophylactic dose of an antibiotic agent was administered within the 30 minutes before surgery
- The entry point and surgical access pathway were determined as to C-arm views.
- A piercing point was verified 8 cm lateral to the posterior midline for a transforaminal approach

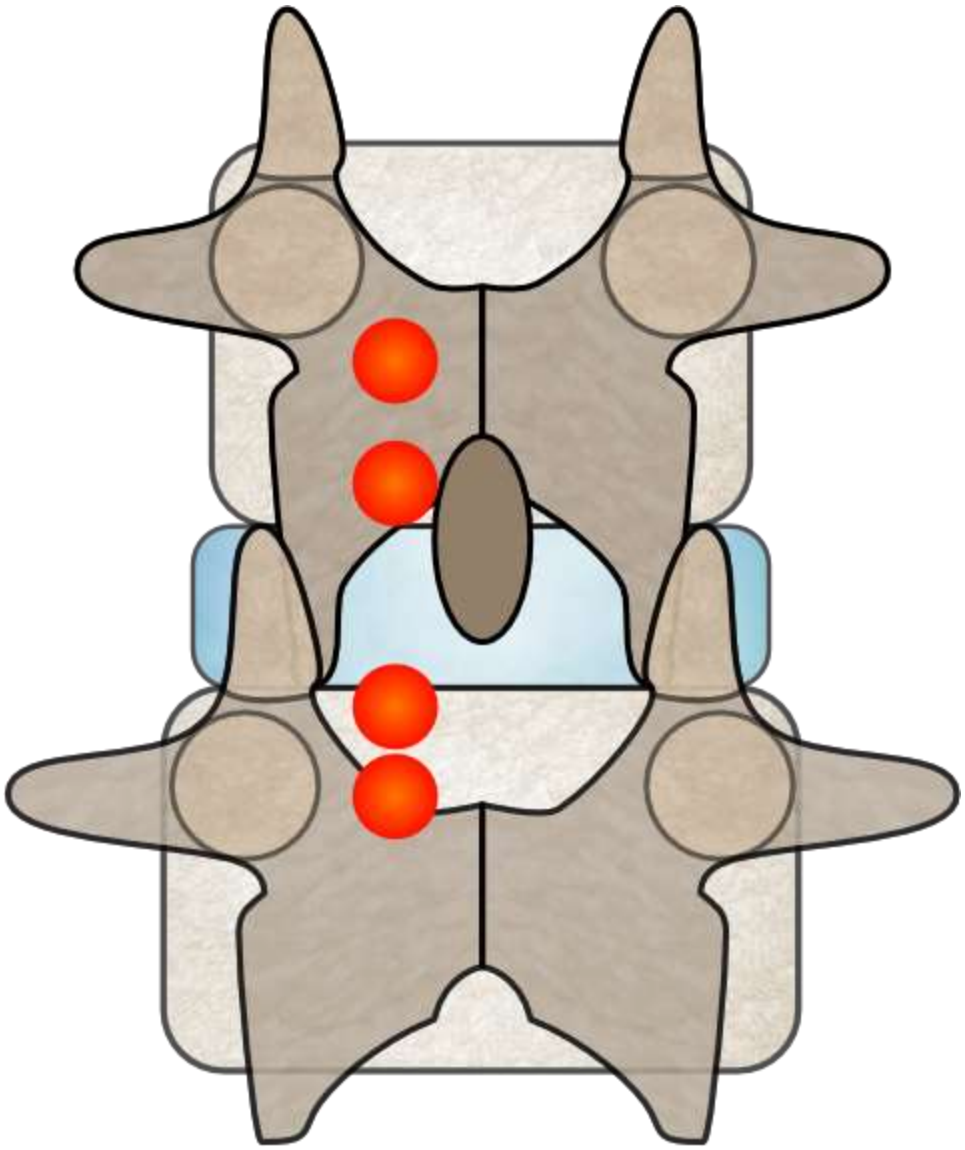
Planning working trajectory

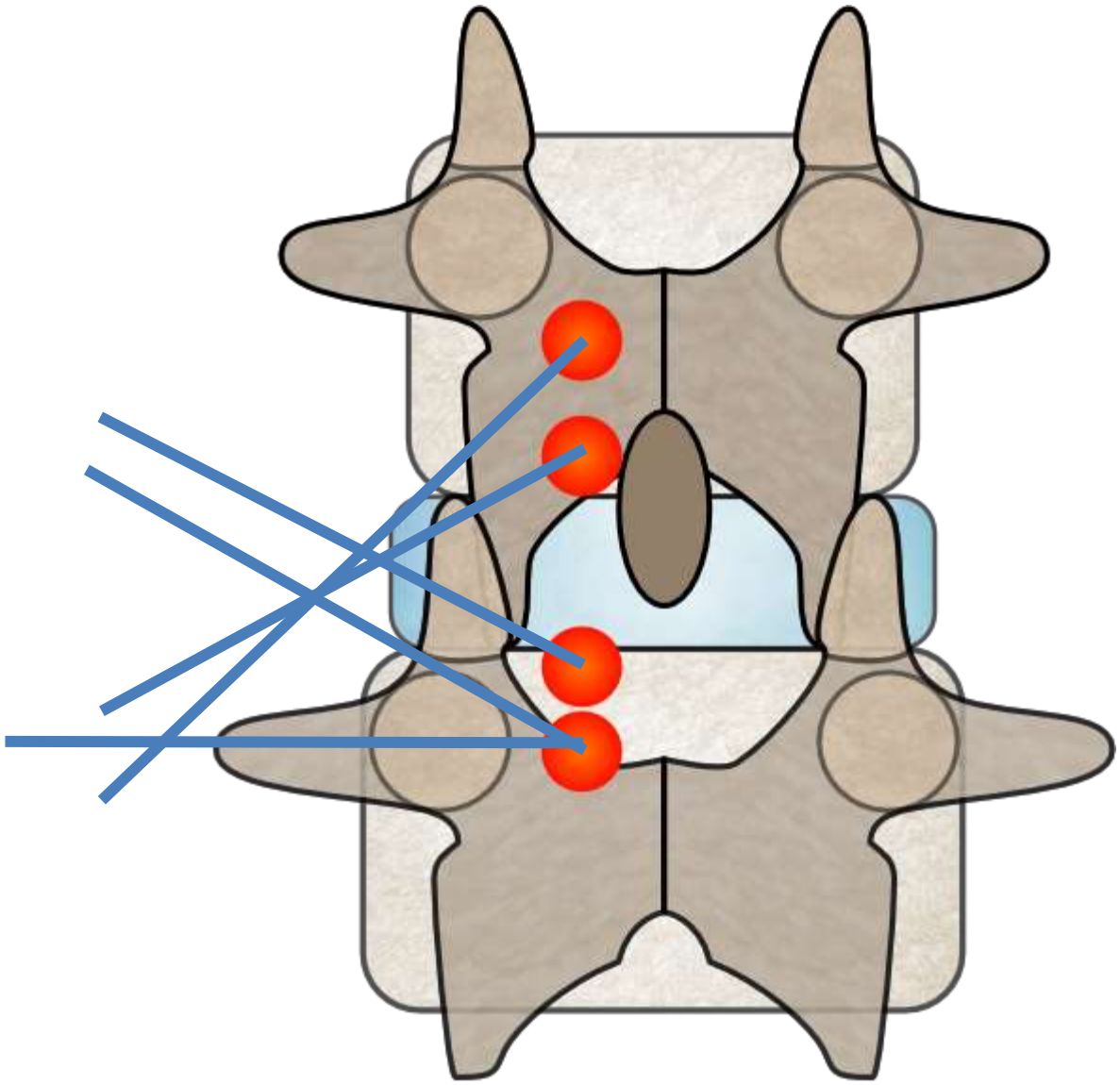
Challenge at L5 / S1?

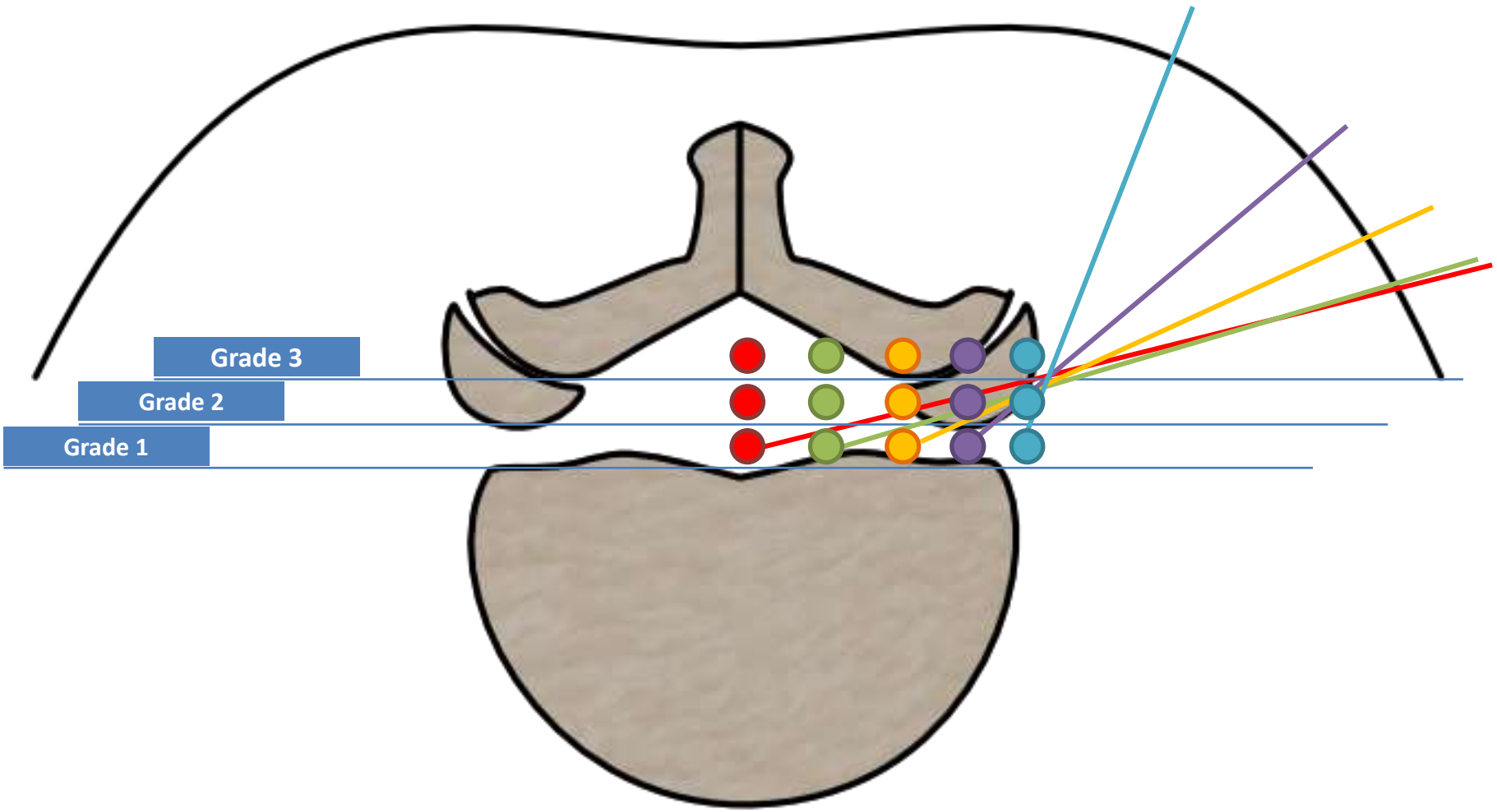
- Narrow AP Diameter of foramen
- **Iliac crest – Can be large**
- Ilio-Lumbar fascia-calcified in old large traverse process L5
- Alla of sacrum
- **Large interpedicular distance**
- Broad & horizontally oriented facet
- Lumbalised / Sacralised



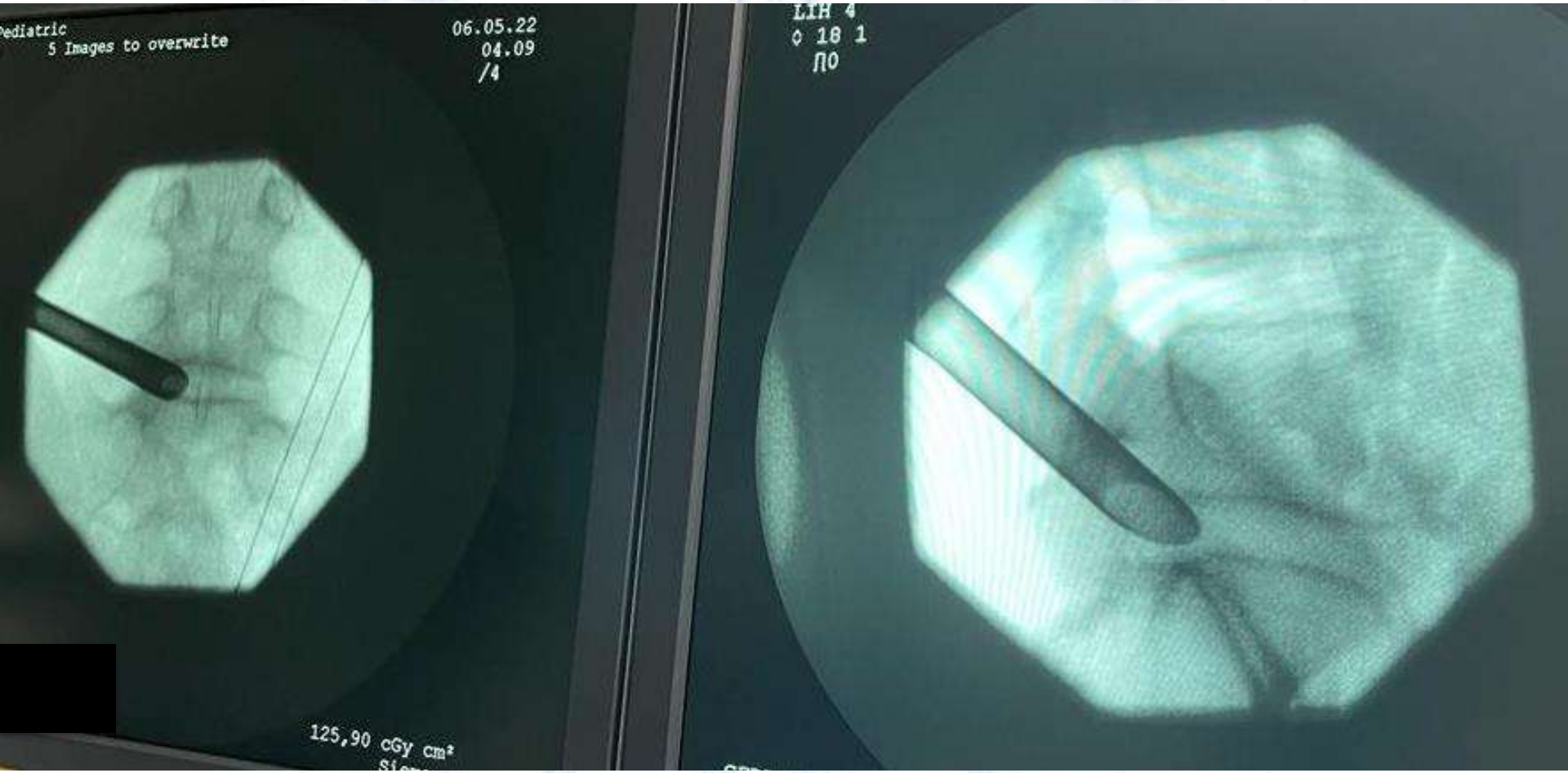







Grade 3
Grade 2
Grade 1

Entry point L5/S1


ediatric
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06.05.22
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125,90 cGy cm²
LIH 4
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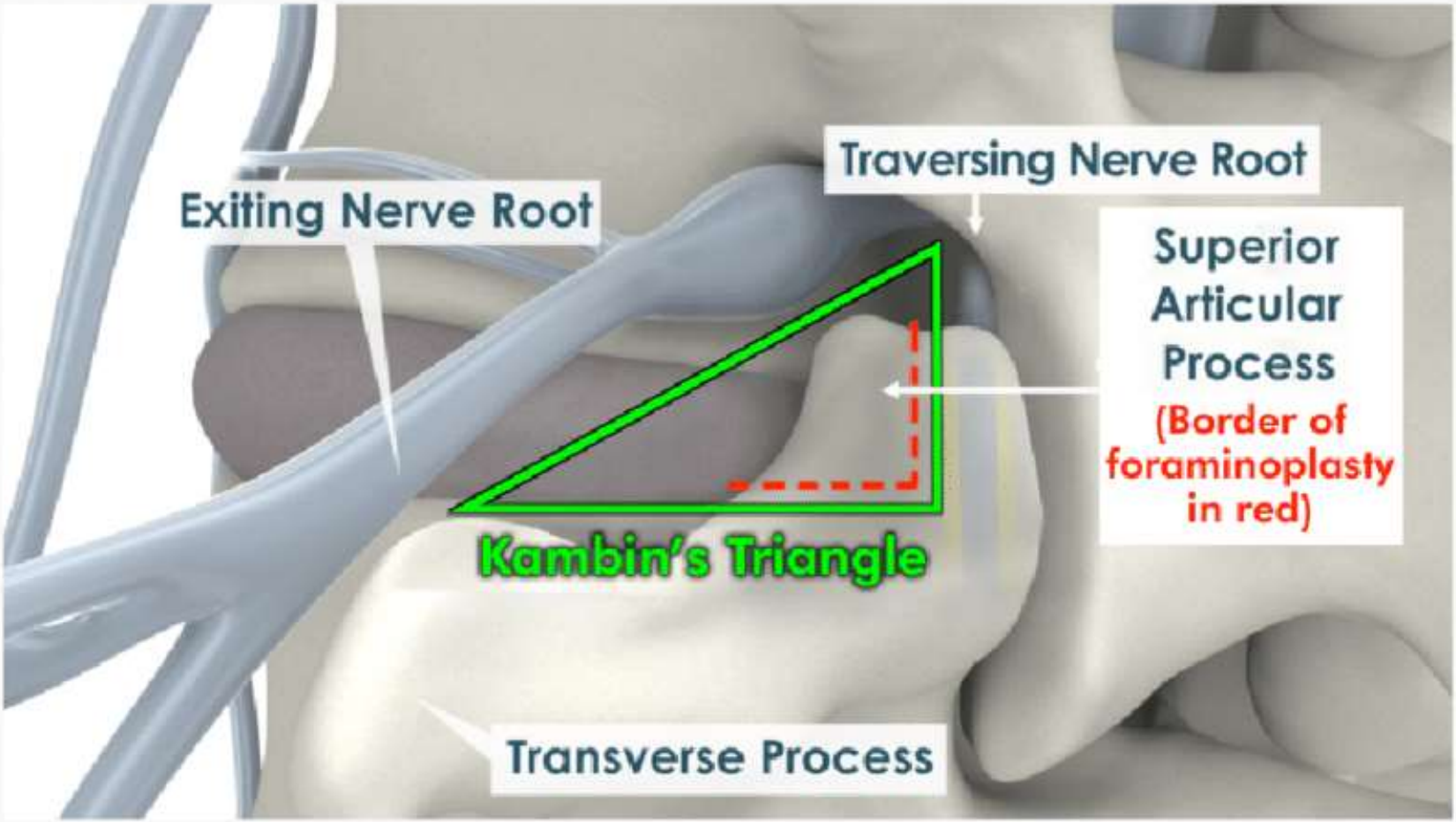
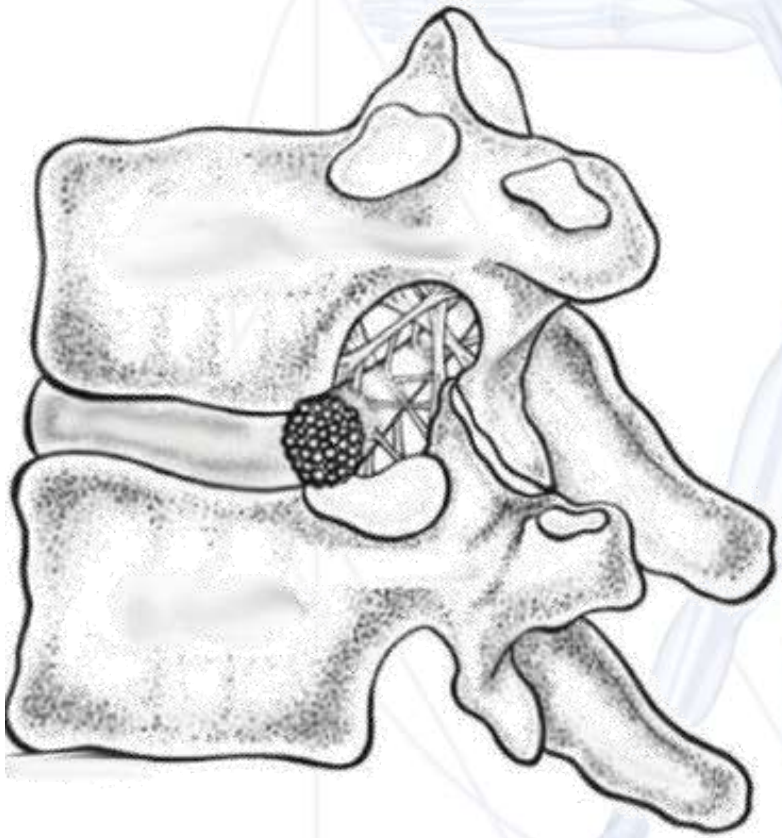
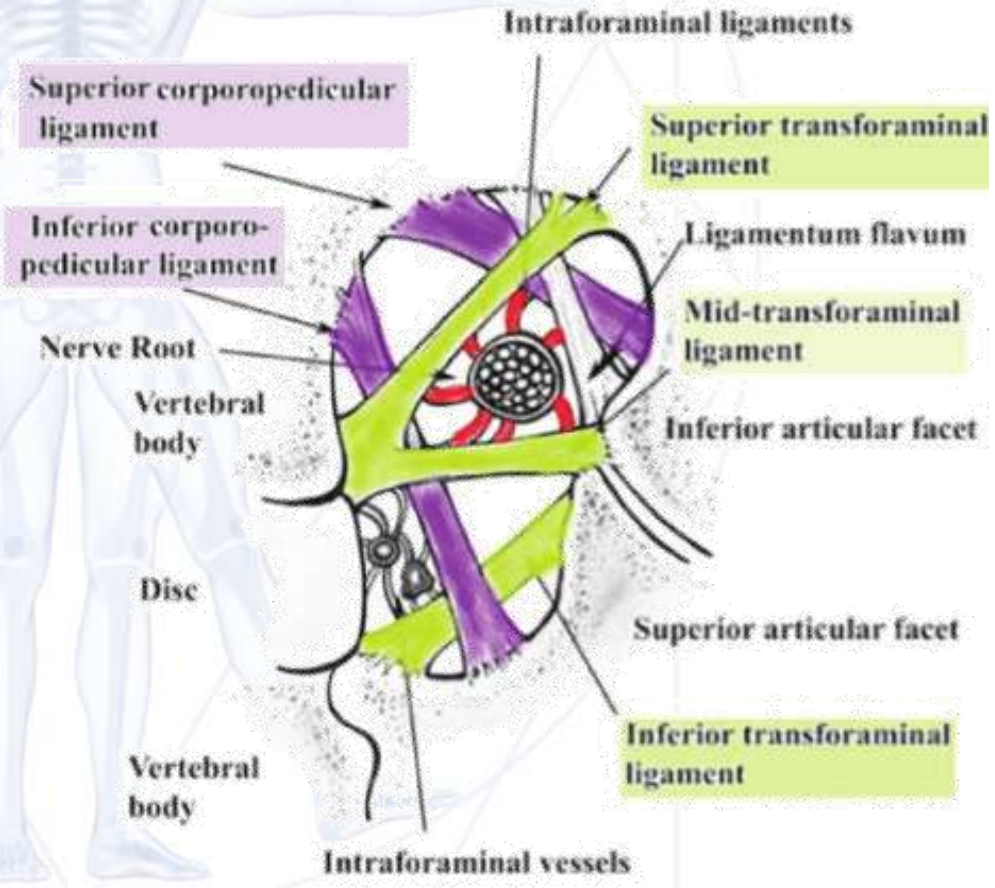
Kambin's Triangle



Spinal ligaments

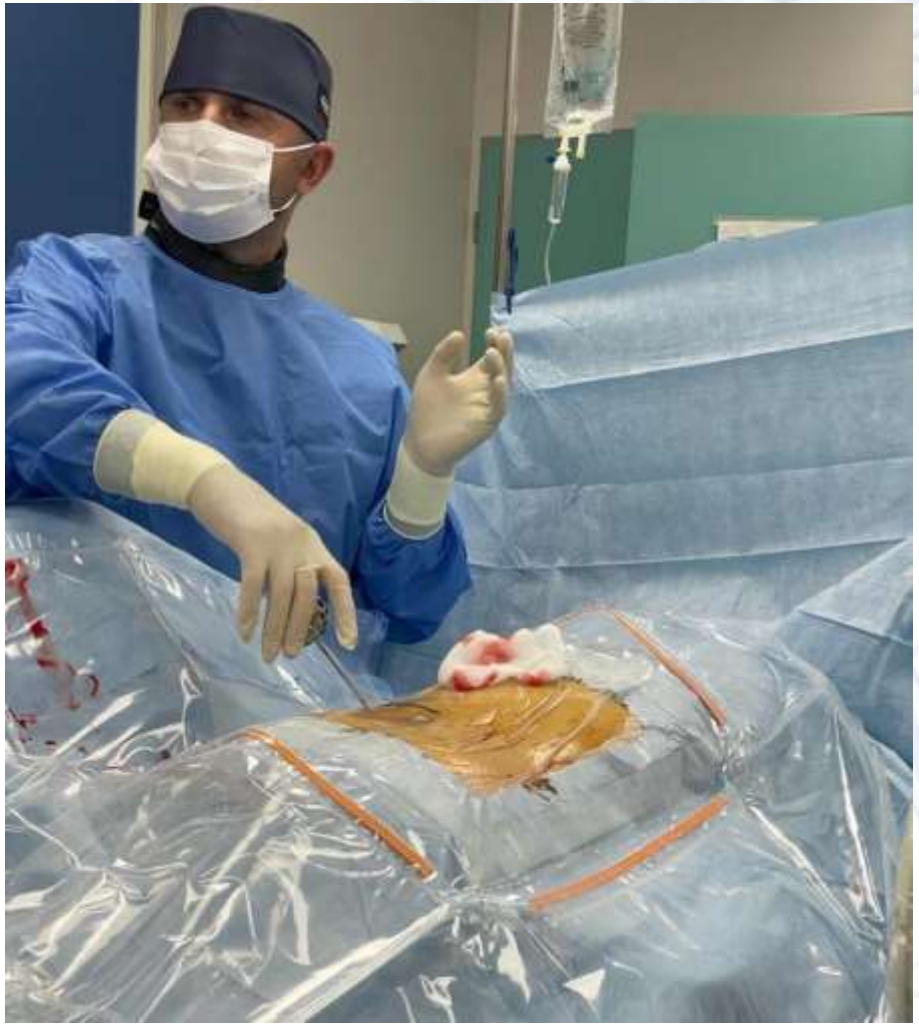




Extracting free disc fragments

RF modulation of the posterior anulus

Closing



- Phone follow up 24 hrs later: significant pain relief at the left leg, postprocedure pain at the incision area, light tingling at the dorsolateral area of the left leg
- VAS (back pain) – 0
- VAS (leg pain) - 2

Postsurgical examination in our clinic

Postsurgical examination in our clinic

Postsurgical examination in our clinic

Clinical physiotherapy examination performed by **Bjorn Aasa**

A. Inadequte core strength discovered

B. Movement disorder of pelvic structures

100% pain free and no motor or sensory deficit 2 weeks after surgery

The girl on 5 months follow up

no medication, no clinical problems, VAS - 0

Actual guidelines

A NICE (2016) guidance on **percutaneous transforaminal** endoscopic lumbar discectomy for sciatica was published in 2016. The guidance stated that current evidence is adequate to support the use of percutaneous transforaminal endoscopic lumbar discectomy for sciatica. Choice of operative procedure (open discectomy, microdiscectomy, or percutaneous endoscopic approaches) may be influenced by symptoms, and location and size of prolapsed disc.

A NICE (2016) guidance on **percutaneous interlaminar** endoscopic lumbar discectomy for sciatica was also published in 2016. The guidance stated that current evidence is adequate to support the use of percutaneous interlaminar endoscopic lumbar discectomy for sciatica. Choice of operative procedure (open discectomy, microdiscectomy, or percutaneous endoscopic approaches) may be influenced by symptoms and location and size of prolapsed disc.

Radiation

N	Age	G	Approach	Level and characteristics	Time (sec)	Radiation (mGy)
1	55	F	TF	L3L4 - foraminal - extrusion	00:48	28.036
2	51	M	TF	L5S1 - foraminal - extrusion	00:40	29.350
3	71	M	TF	L4L5 - posterolateral - extrusion	00:45	35.296
4	35	M	IL	L5S1 - posterolateral - extrusion	00:19	11.352
5	40	F	TF	L1L2 - central - extrusion	00:59	40.704
6	30	M	TF	L4L5 - posterolateral - extrusion	00:28	21.939
7	63	M	TF	L4L5 - posterolateral - protrusion	00:44	37.110
8	54	M	TF	L4L5 - posterolateral - down migration	00:34	23.871
9	42	M	TF	L4L5 - posterolateral - down migration	00:23	15.254
10	41	M	IL	L5S1 - posterolateral - extrusion	00:09	4.236
11	59	M	TF	L4L5 - posterolateral - extrusion	00:34	17.308
12	41	F	TF	L5S1 - central - extrusion	00:50	25.510
13	41	F	TF	L4L5 - central - extrusion	01:30	30.400
14	38	M	IL	L4L5 - posterolateral - down migration	00:09	13.860
15	72	M	IL	L5S1 - central - extrusion	00:06	5.115
16	32	M	TF	L4L5 - posterolateral - extrusion	00:42	31.963
17	39	F	TF	L4L5 - posterolateral - extrusion	00:35	37.490
18	37	F	TF	L5S1 - foraminal - extrusion	00:29	30.620
19	49	F	IL	L5S1 - posterolateral - extrusion	00:17	11.079
20	41	M	IL	L5S1 - posterolateral - extrusion	00:07	4.566

Abbreviations: F, female; G, gender; IL, interlaminar; M, male; mGy, miligray; n, number; sec, seconds; TF, transforaminal.

It is believed that several years later, PELD surgery could be widely applied in the treatment of lumbar intervertebral disc diseases and degenerative lumbar diseases, or even anterior spinal fusion, arteficial nucleus pulposus implantation, spinal cell implantation, and so on.

Comparison of tissue damages caused by endoscopic lumbar discectomy and traditional lumbar discectomy:

A randomised controlled trial.

LeiPan, PeifangZhang, QingshuiYin

THANK YOU