DIU de Pathologie Locomotrice liée à la Pratique du Sport

Rachis et bassin – 22 Mars 2018, LYON

Rachis et Sport
Qui opérer ? Quand ? Comment ? Quand reprendre ?

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Hôpital Neurologique P Wertheimer, Hospices Civils de LYON

LOMBALGIE et RADICULALGIE chez le SPORTIF

1. Sources de la douleur
2. Principes des techniques chirurgicales
3. Indications chez le sportif
4. Résultats – Reprise du sport

Origine de la douleur

DOULEUR

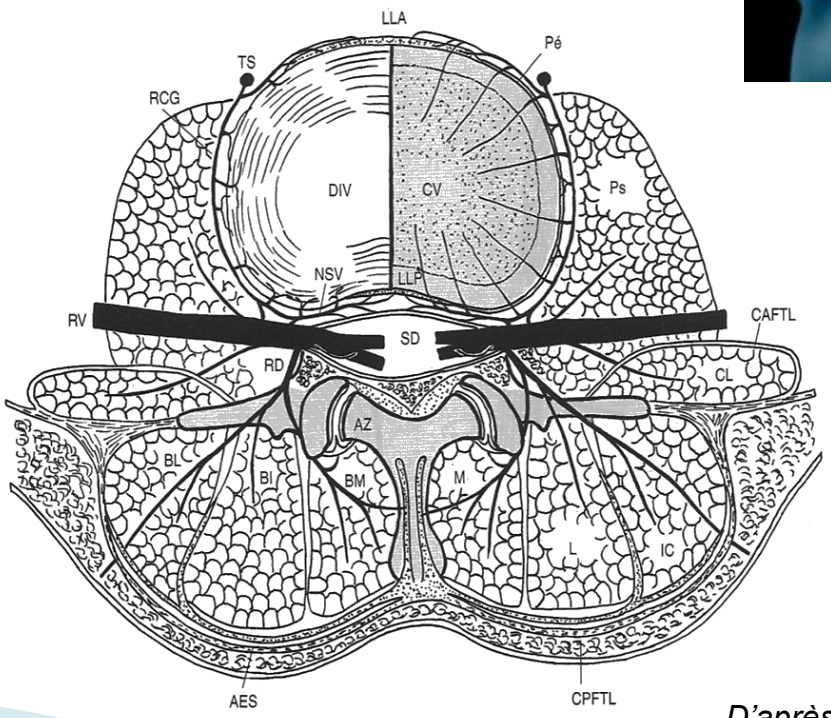
1- Disque intervertébral

2- Articulations zygapophysaires

3- Ligaments

4- Muscles

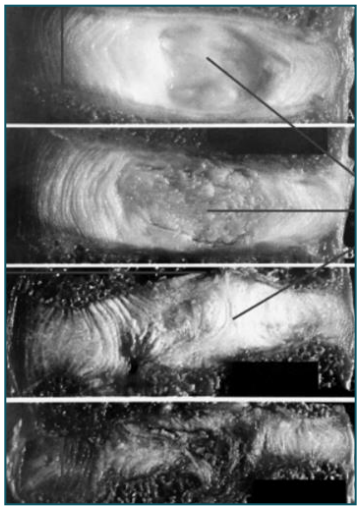
5- Os



D'après Bogduk, Elsevier 2005

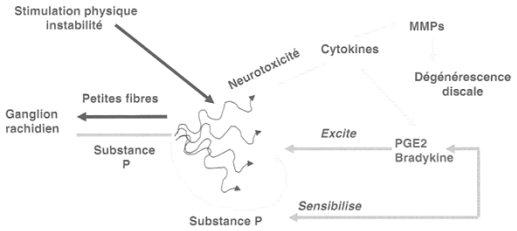
Disque intervertébral

- Source principale de la douleur



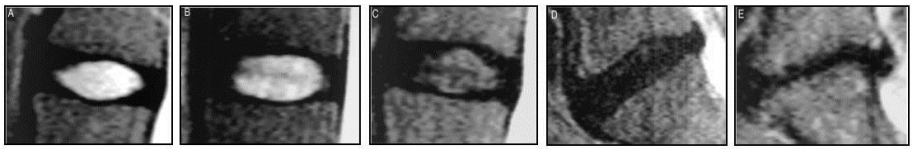
- Présence de fibres nociceptives
- Médiateurs pro-inflammatoires
  - Substance P
  - Prostaglandines, IL

  …/…

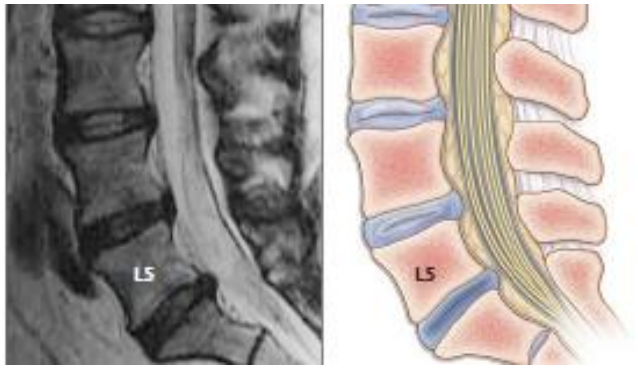


- Prolifération des **Fibres Nociceptives** parallèlem[t] au processus de dégénérescence discale

Freemont, Lancet 1997; Coppes, Spine 1997; Peng, JBJS (Br) 2005

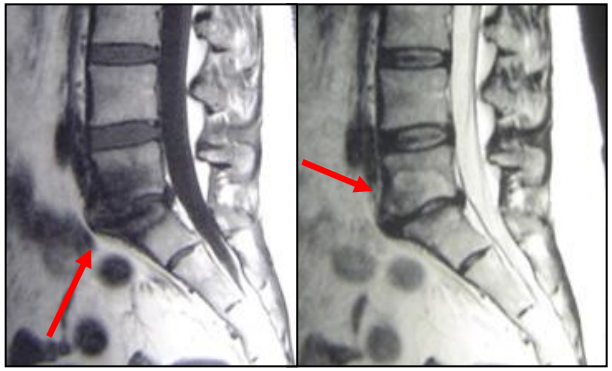


Dégénérescence discale



- Discopathie dégénérative isolée

  perte de hauteur discale chez 13% jeunes rugbymen

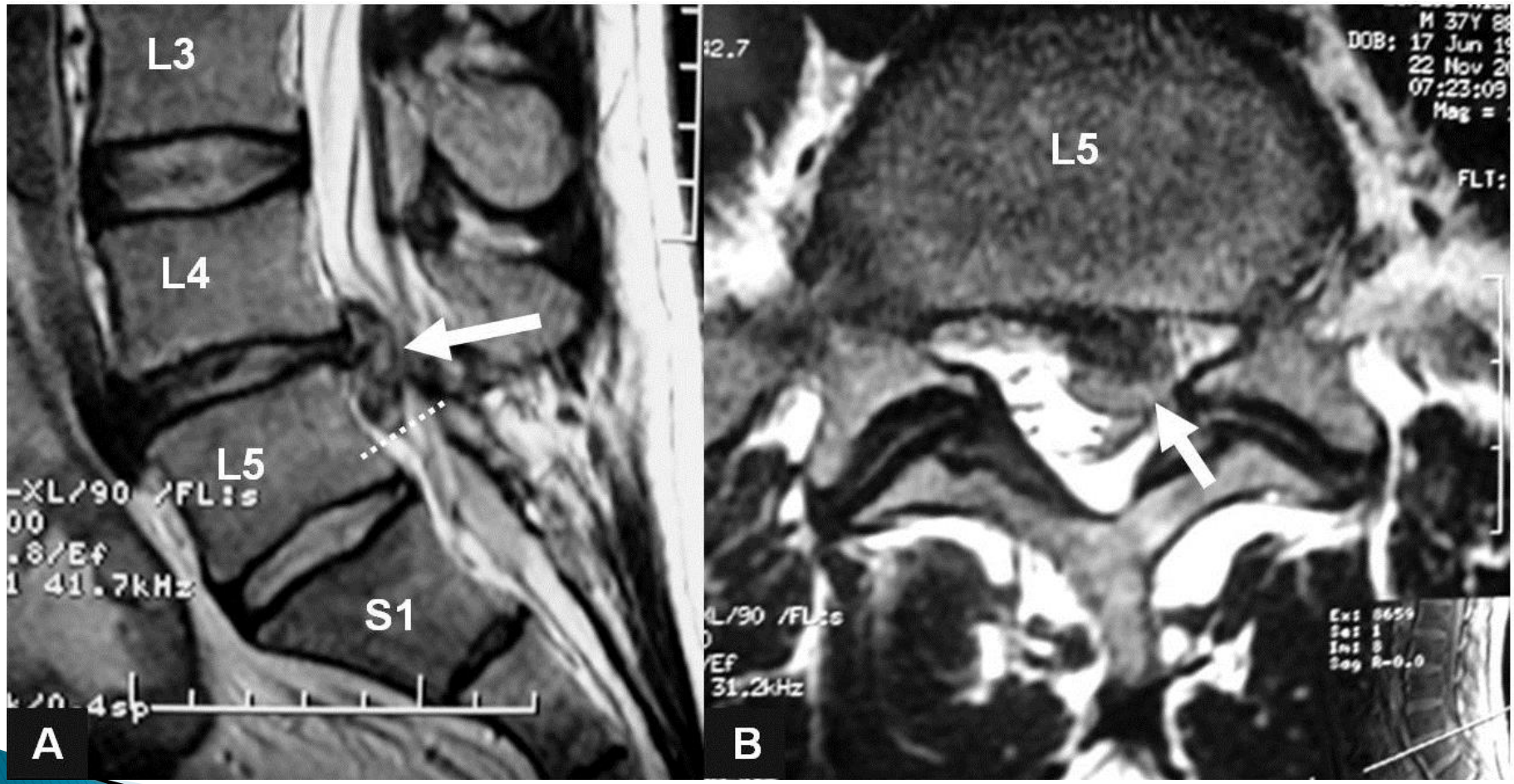


- Discopathie inflammatoire

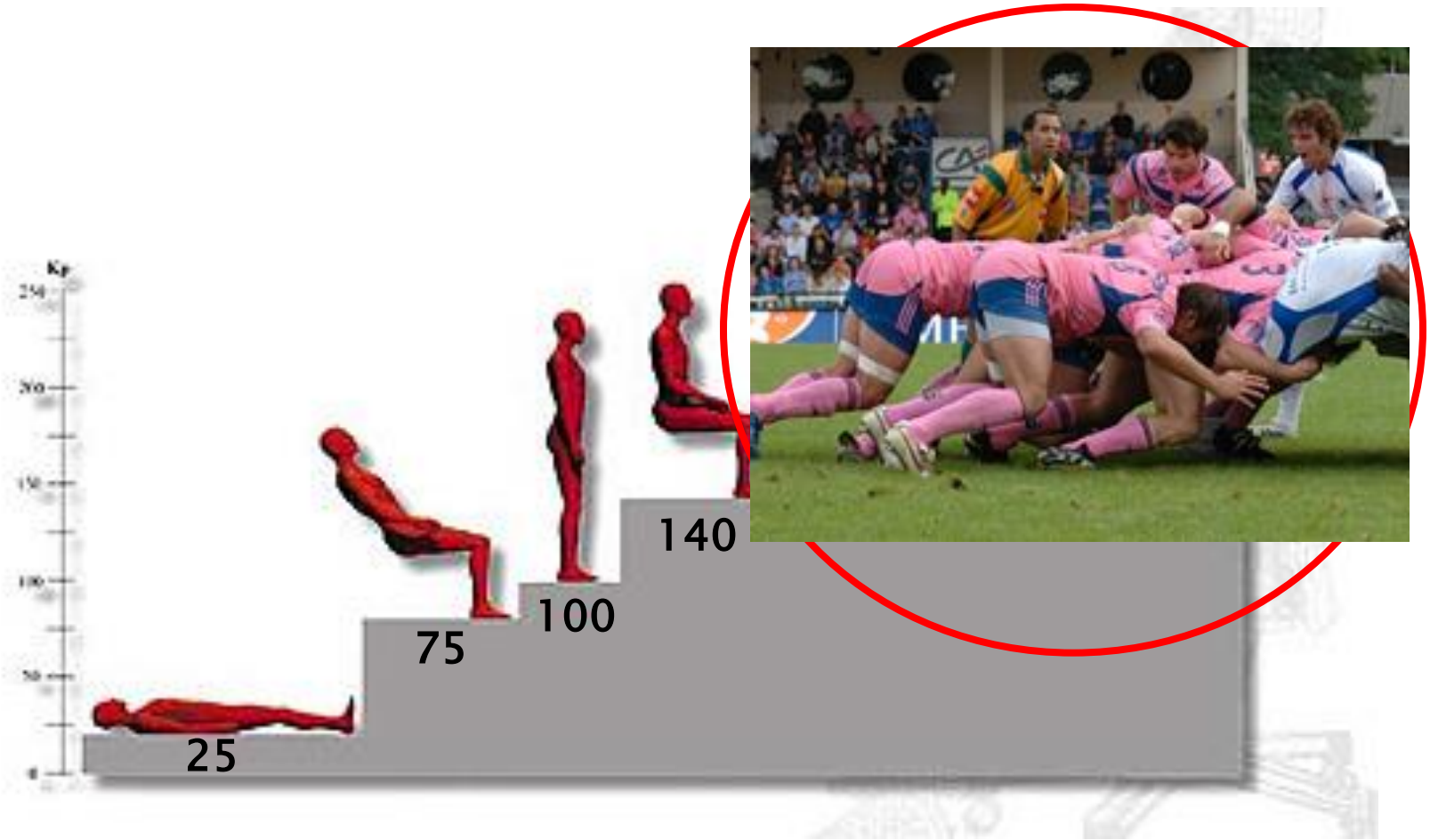
- Compliquée d'un conflit disco-radiculaire

  = hernie discale

Volumineuse hernie discale L4-L5, postéro-latérale gauche, migrée vers le bas



Pressions discales et posture

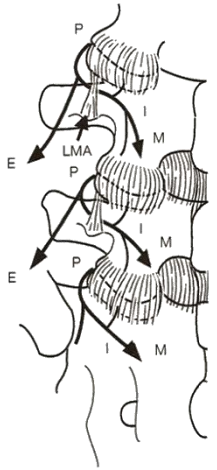


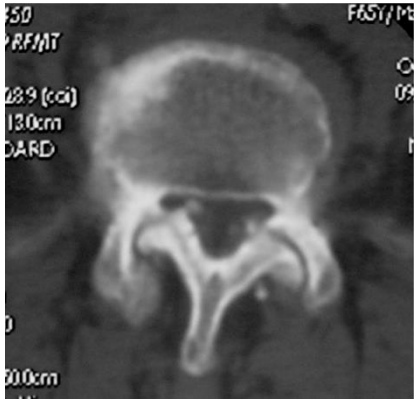
Nachemson, Spine 1966

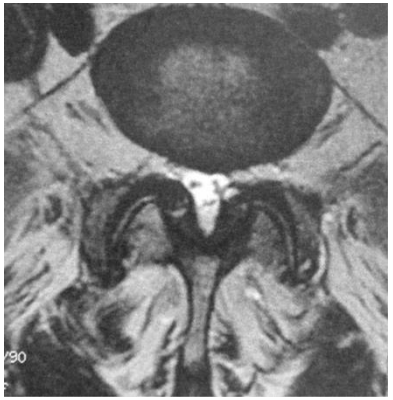
Articulations zygapophysaires

- Atteinte arthrosique

- Fissuration / érosion cartilage
- Hypertrophie/ ostéophytose







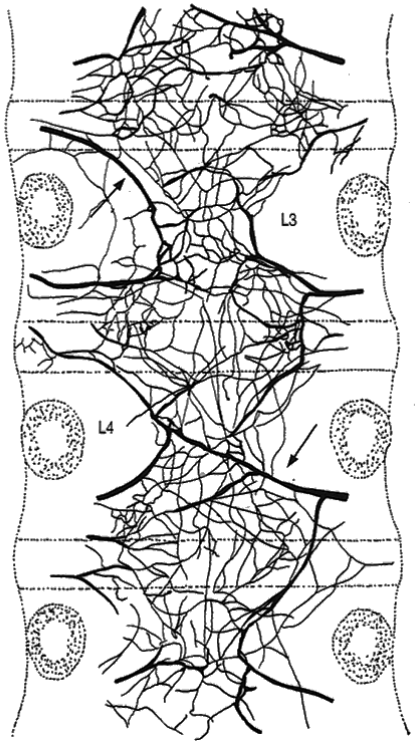
Spine (Phila Pa 1976). 1979 Sep-Oct;4(5):441-6.

Induced pain referral from posterior lumbar elements in normal subjects.

McCall IW, Park WM, O'Brien JP.

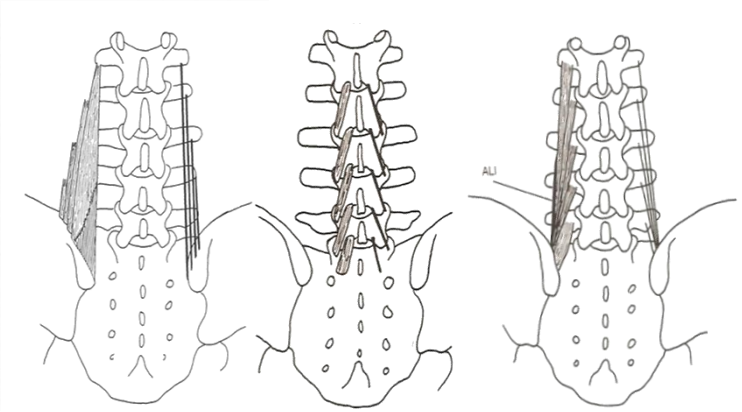
Ligaments

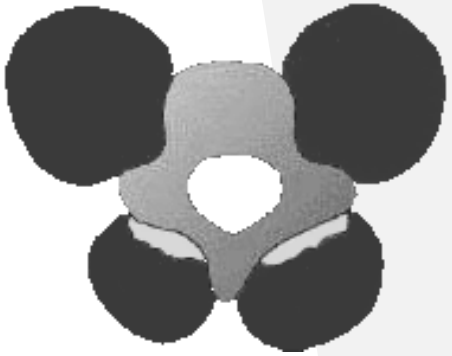
- Richement innervés (LLP +++)
- Risque de douleur en cas d'étirement
  - Protrusion discale
  - Glissement
  - Hypermobilité segmentaire
- Lombalgie aigüe ou sub-aigüe



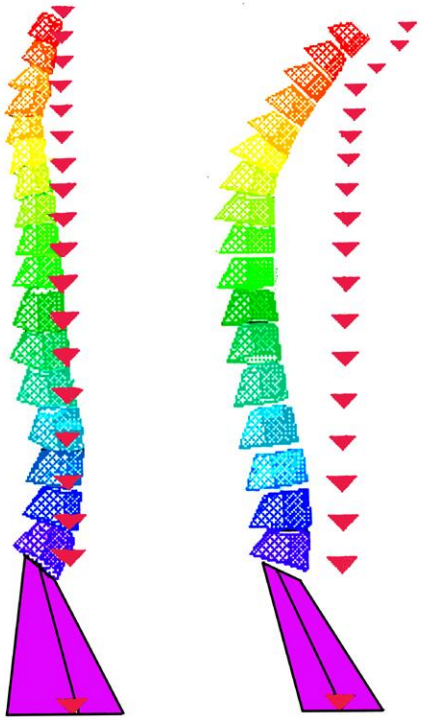
D'après Bogduk, Elsevier 2005

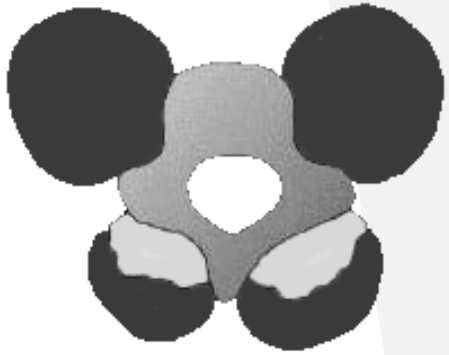
Muscles

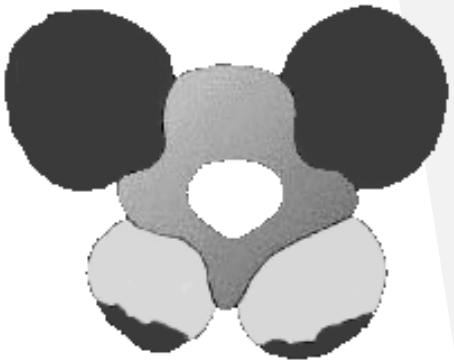




- Déchirure
- Contracture chronique
- Déséquilibre







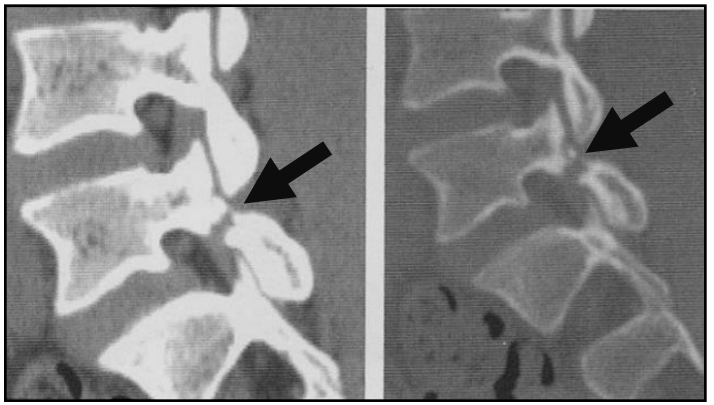
• **Takemitsu Y., Harrada Y., Iwahara T.**
Lumbar degenerative kyphosis
Spine 1988, 13, 1317-1326

• **Pomero V, Lavaste F, Skalli W.**
Model to estimate trunk muscles forces
Comput Meth Biomed Biomech Eng, 2004

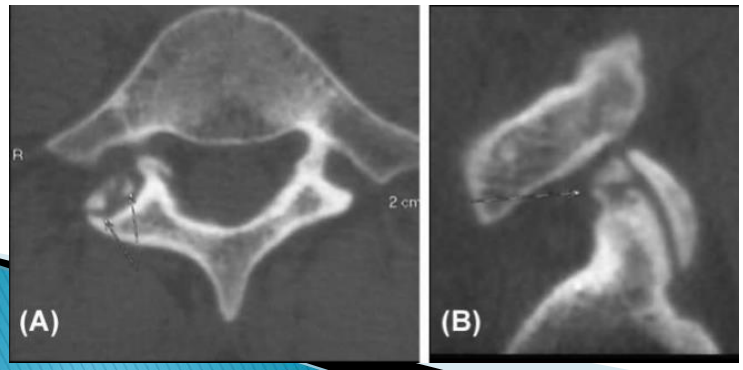
Les structures osseuses

(Traumatismes aigus)

- Fracture de fatigue: spondylolyse ++
  - 1ère **cause de lombalgie du sujet jeune**
  - Fréquence augmentée chez les sportifs
  - Lombalgie aigue et chronique



- Autres: Fracture facette sacrée



Skaggs, Spine 2012

Principales lésions

- **Discopathies et hernie discales**
  1) – Sports en flexion/compression (ski, rugby, haltérophilie, plongeon…)
  2) – Sports en rotation « pivot » (tennis, basket…)

- **Spondylolyse et spondylolisthésis**
  - Sports en extension (gymnastique, lutte…)
  - charges répétées transmises à la jonction lombosacrée

- **Troubles statiques – DRC**
  - Dystrophie rachidienne de croissance
  - Sports en flexion/compression

J Bone Joint Surg Am. 2004 Feb;86-A(2):382-96.

Low-back pain in athletes.

Bono CM.

Department of Orthopaedic Surgery, Boston University Medical Center, 850 Harrison Avenue, Dowling 2 North, Boston,

Abstract

While most occurrences of low-back pain in athletes are self-limited sprains or strains, persistent, chronic, or recurrent symptoms are frequently associated with degenerative lumbar disc disease or spondylolytic stress lesions. The prevalence of radiographic evidence of disc degeneration is higher in athletes than it is in nonathletes; however, it remains unclear whether this correlates with a higher rate of back pain. Although there is little peer-reviewed clinical information on the subject, it is possible that chronic pain from degenerative disc disease that is recalcitrant after intensive and continuous nonoperative care can be successfully treated with interbody fusion in selected athletes. In general, the prevalence of spondylolysis is not higher in athletes than it is in nonathletes, although participation in sports involving repetitive hyperextension maneuvers, such as gymnastics, wrestling, and diving, appears to be associated with disproportionately higher rates of spondylolysis. Nonoperative treatment of spondylolysis results in successful pain relief in approximately 80% of athletes, independent of radiographic evidence of defect healing. In recalcitrant cases, direct surgical repair of the pars interarticularis with internal fixation and bone-grafting can yield high rates of pain relief in competitive athletes and allow a high percentage to return to play. Sacral stress fractures occur almost exclusively in individuals participating in high-level running sports, such as track or marathon. Treatment includes a brief period of limited weight-bearing followed by progressive mobilization, physical therapy, and return to sports in one to two months, when the pain has resolved.

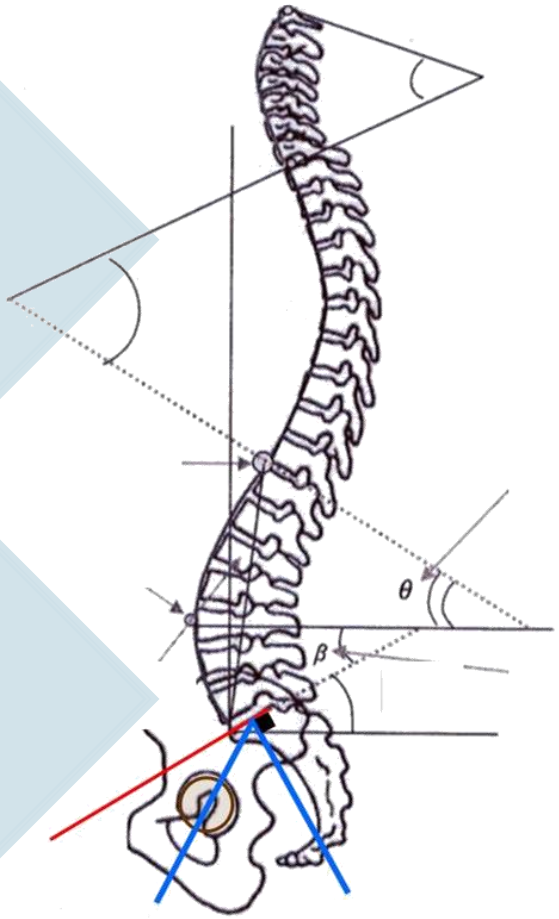
Impact de la statique

Morphotype

- Sollicitations discales
- Sollicitations des éléments postérieurs

CSQ déséquilibre

- Mécanismes de compensation
- Douleurs musculaires

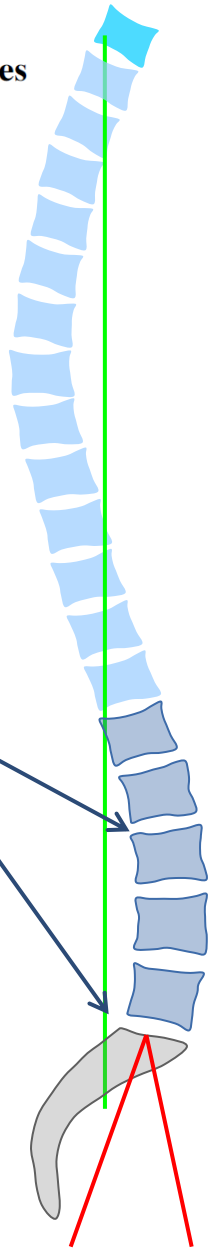


- ***Roussouly*** *P, Spine 2005*
- ***Barrey*** *C, Eur Spine J 2007, 2011*
- ***Obeid*** *I, Eur Spine J 2011*

Sagittal balance of the pelvis-spine complex and lumbar degenerative diseases. A comparative study about 85 cases

Eur Spine J (2007) 16:1459–1467

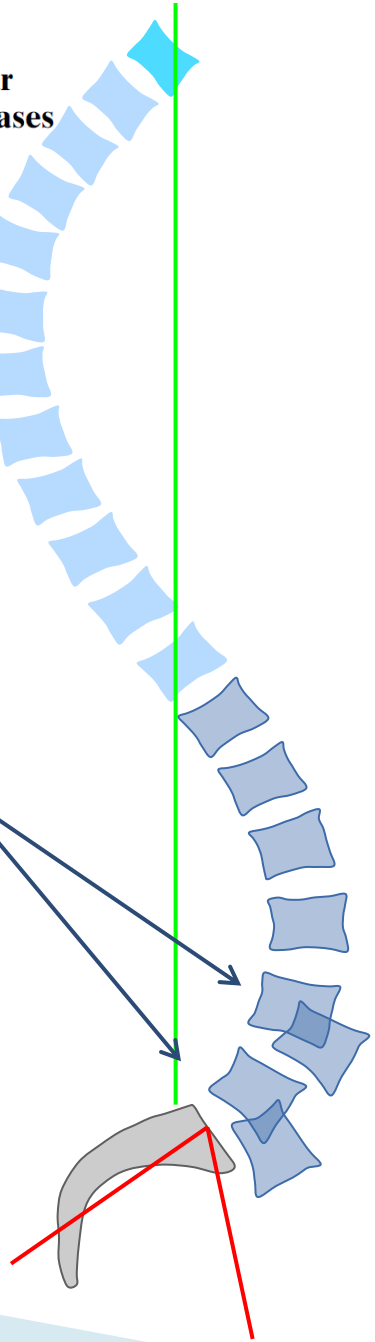
- Hyperpression discale antérieure
- Discopathies et hernies discales précoces volontiers pluri-étagées

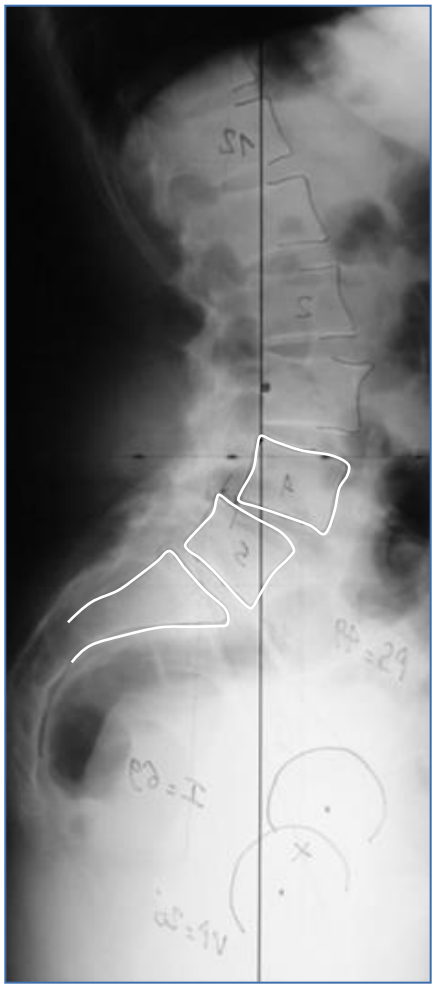


Sagittal balance of the pelvis-spine complex and lumbar degenerative diseases. A comparative study about 85 cases

Eur Spine J (2007) 16:1459–1467

- Arthrose zygapophysaire
- Contacts épineux
- Lyse isthmique ± SPL de Ht grade et dégénératifs
- Discopathies tardives avec perte de lordose



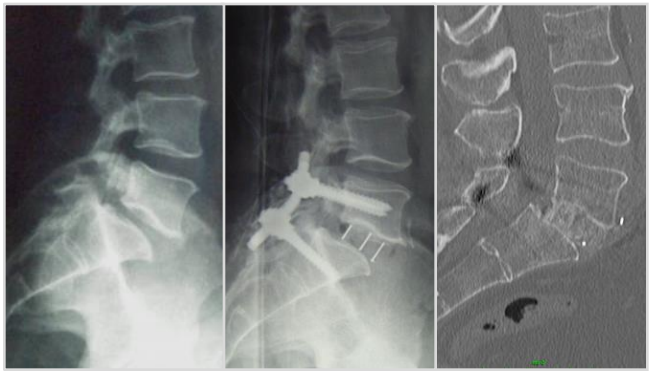


TECHNIQUES CHIRURGICALES

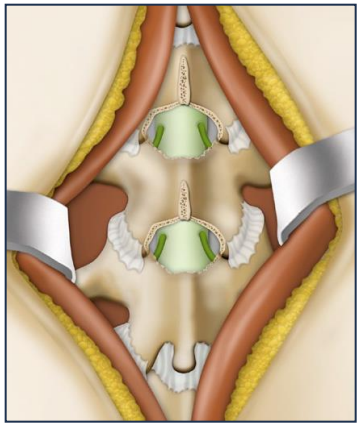
Objectif

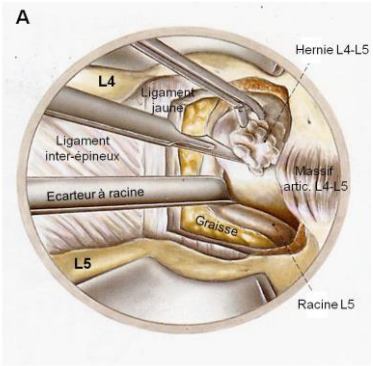
STABILISATION
 # Arthrodèse

DECOMPRESSION
 # herniectomie / recalibrage



Arthrodèse L5-S1





Peu de spécificité chez le sportif

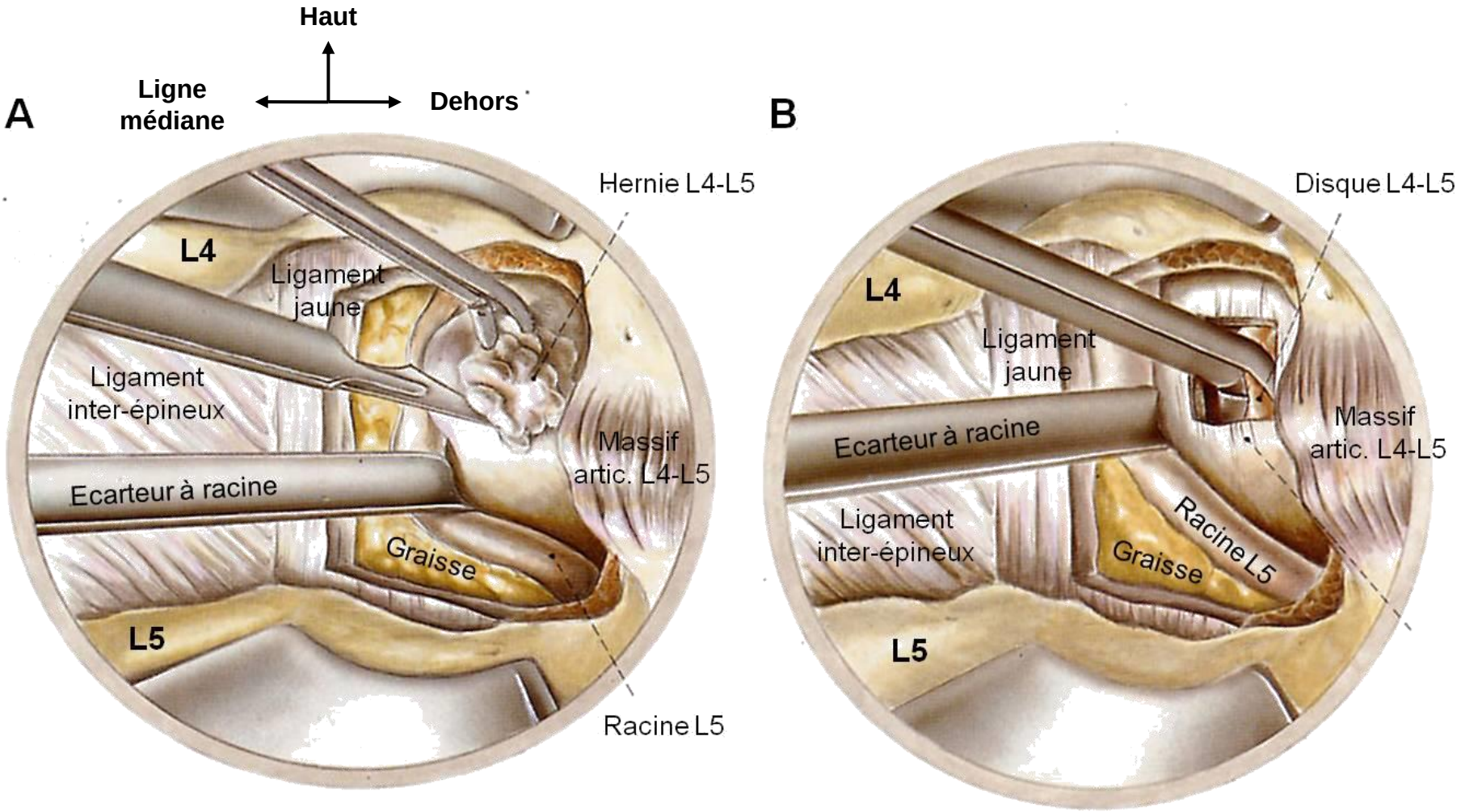
Techniques de décompression

BUT: Soulager la douleur radiculaire ++

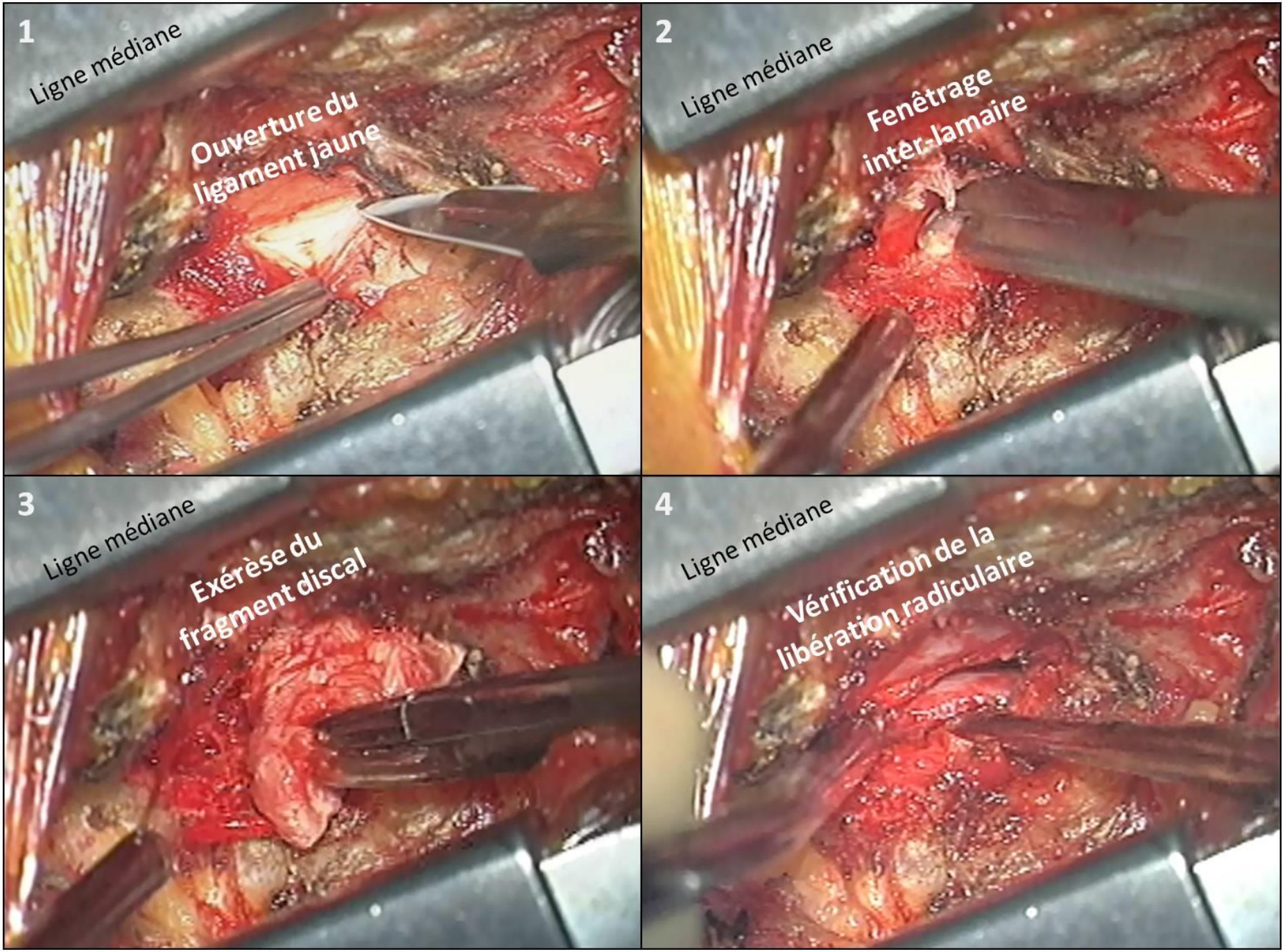
1) **CHIRURGIE DE LA HERNIE DISCALE**

2) RECALIBRAGE CANALAIRE

Hernie discale: technique classique



D'après Bauer R, Kerschbaumer F, Poisel S. Techniques de chirurgie orthopédique, tome 1 : Rachis, infections et pertes de substances, Masson eds, Paris, 1993.

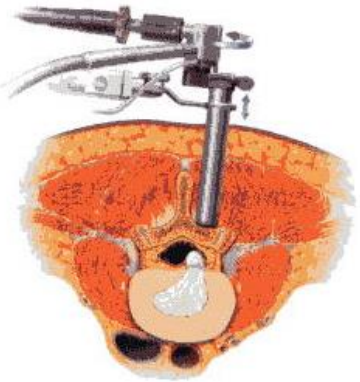

1
Ligne médiane
Ouverture du ligament jaune
2
Ligne médiane
Fenêtrage inter-lamaire
3
Ligne médiane
Exérèse du fragment discal
4
Ligne médiane
Vérification de la libération radiculaire

Techniques mini-invasives

Les suites post-opératoires immédiates des techniques mini-invasives sont plus simples et moins douloureuses ; en revanche, à moyen et long termes, il n'y a aucune différence avec la technique conventionnelle.

- Technique microchirurgicale
  - Utilisation d'un microscope opératoire permettant de réduire la voie d'abord

Peul et al, New Eng J Med 2007



- Technique endoscopique
  - Utilisation d'un tube de travail (« endoscope ») permettant de réduire la voie d'abord
  - Intérêt chez le sportif ++

Arts et al, JAMA 2009

Suites post-opératoires

- Lever J1
- Sortie J2-J3

- Rééducation à partir de 6 semaines
  1. Renforcement musculaire
  2. Assouplissement charnière lombo-pelvi-fémorale
  3. Apprentissage du verrouillage lombaire

- Reprise **progressive** du sport à partir de **3ème mois**

Débuter par des activités douces comme le vélo en terrain plat et/ou la natation
Les sports à risque comme les sports de contact ou les sports collectifs **ne sont pas autorisés avant le 6ème mois post-opératoire**
Chez le sportif: raccourcit les délais
(il faut tt de même 5-6 mois pour revenir au niveau antérieur)

Arthrodèse: objectifs

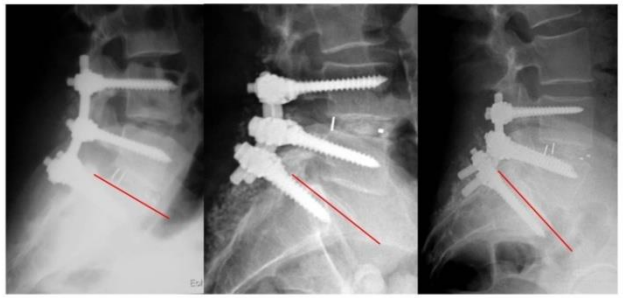
1) STABILISER le segment douloureux

2) RESTAURER la balance sagittale

Eur Spine J. 2000 Feb;9(1):47-55.

Sagittal alignment in lumbosacral fusion: relations between radiological parameters and pain.

Lazennec JY, Ramaré S, Arafati N, Laudet CG, Gorin M, Roger B, Hansen S, Saillant G, Maurs L, Trabelsi R.
Service de Chirurgie Orthopédique et Traumatologique, Hôpital Pitie-Salpetrière 83, Paris, France.

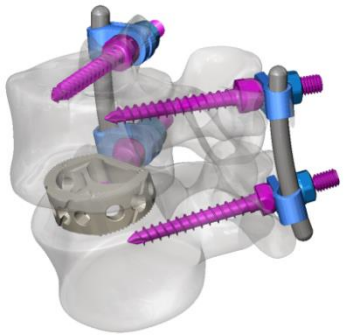


3) GREFFE osseuse → **FUSION**

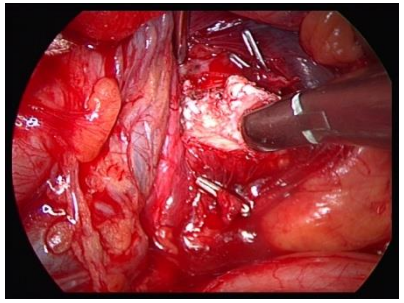
- Prendre le relais de l'instrumentation (stabilité DEFINITIVE)
- Augmenter la surface de répartition des contraintes

Types d'arthrodèse

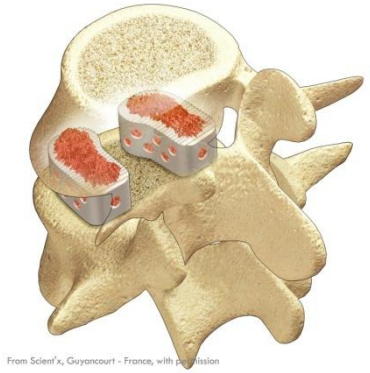
OstéoΣ
- NON instrumentée
- Instrumentée



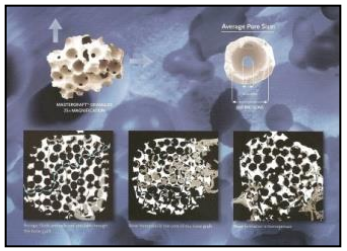
Greffe
- autologue
- Substituts



Site
- intersomatique
- Postéro-médiale/ latérale

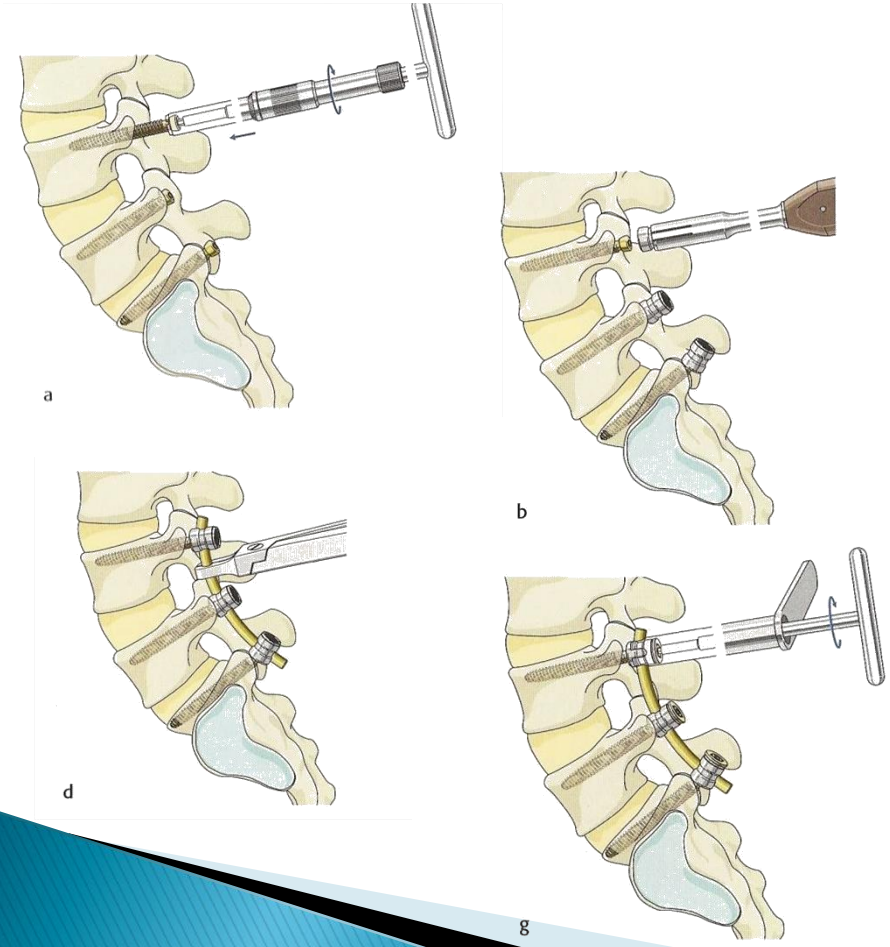


Abord
- Postérieur/ antérieur / latéral
- Combiné

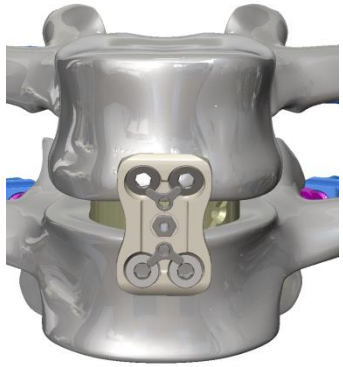


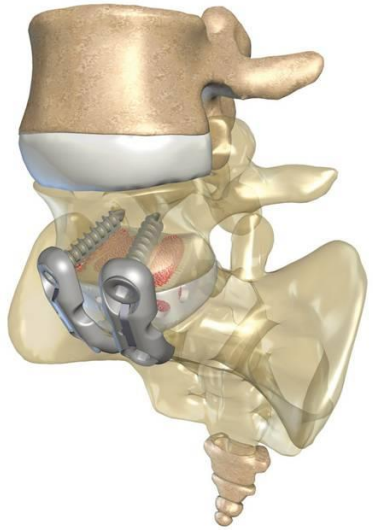
INSTRUMENTATION

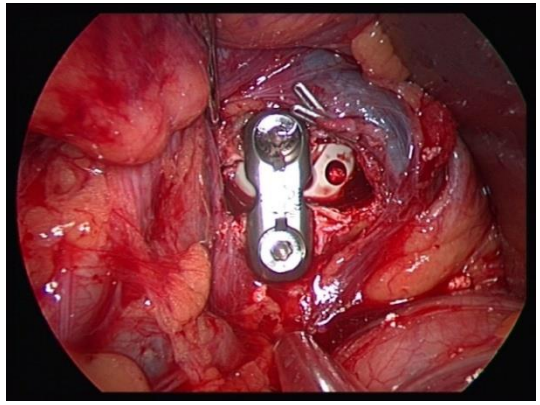
POSTERIEURE



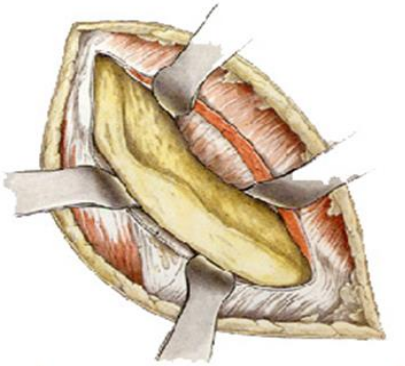
ANTERIEURE







Matériel de greffe



- Autogreffe
- Allogreffe
- Substituts osseux
- Matériaux hybrides
  (substituts osseux + cellules de MO)
- Facteurs de croissance
  (Bone Morphogenic Protein)

Objectif de la greffe

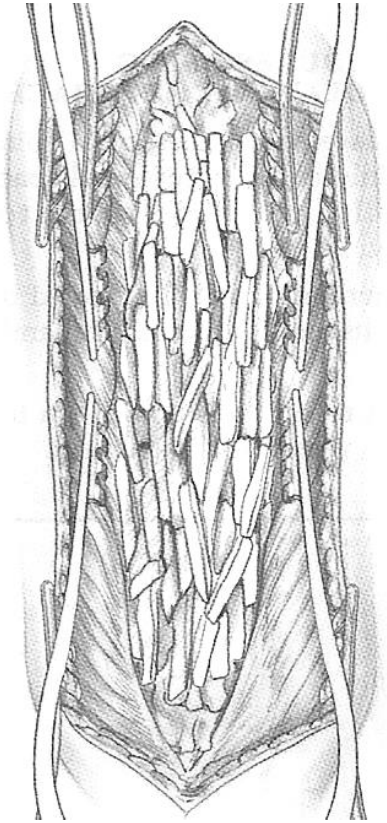
FUSION OSSEUSE

PONT OSSEUX CONTINU

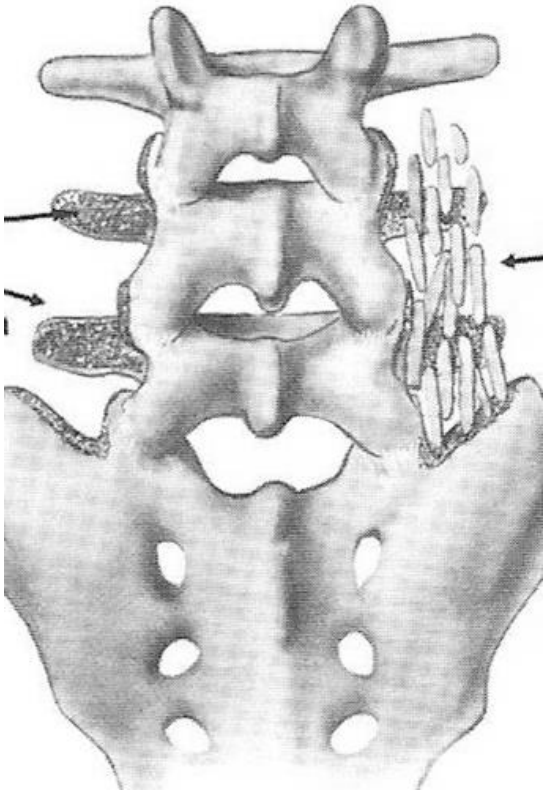
Acquise entre 4 et 10 mois

Transformation progressive de la greffe morcelée et inhomogène en os trabéculaire dense et homogène

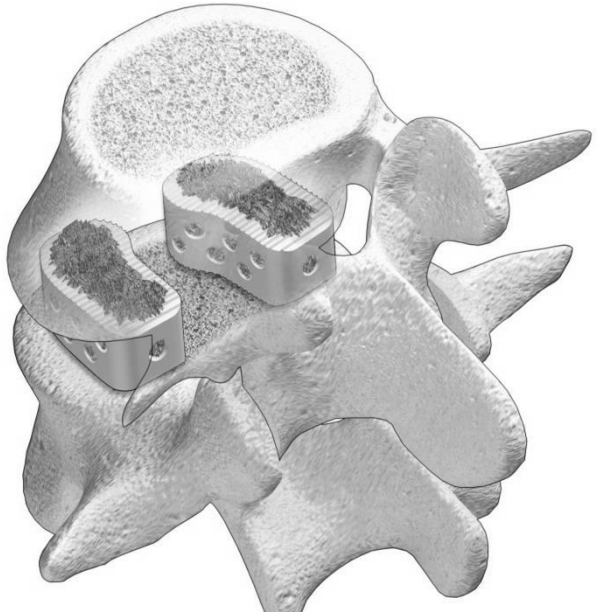
Sites de greffe



APM Postéro-médiane

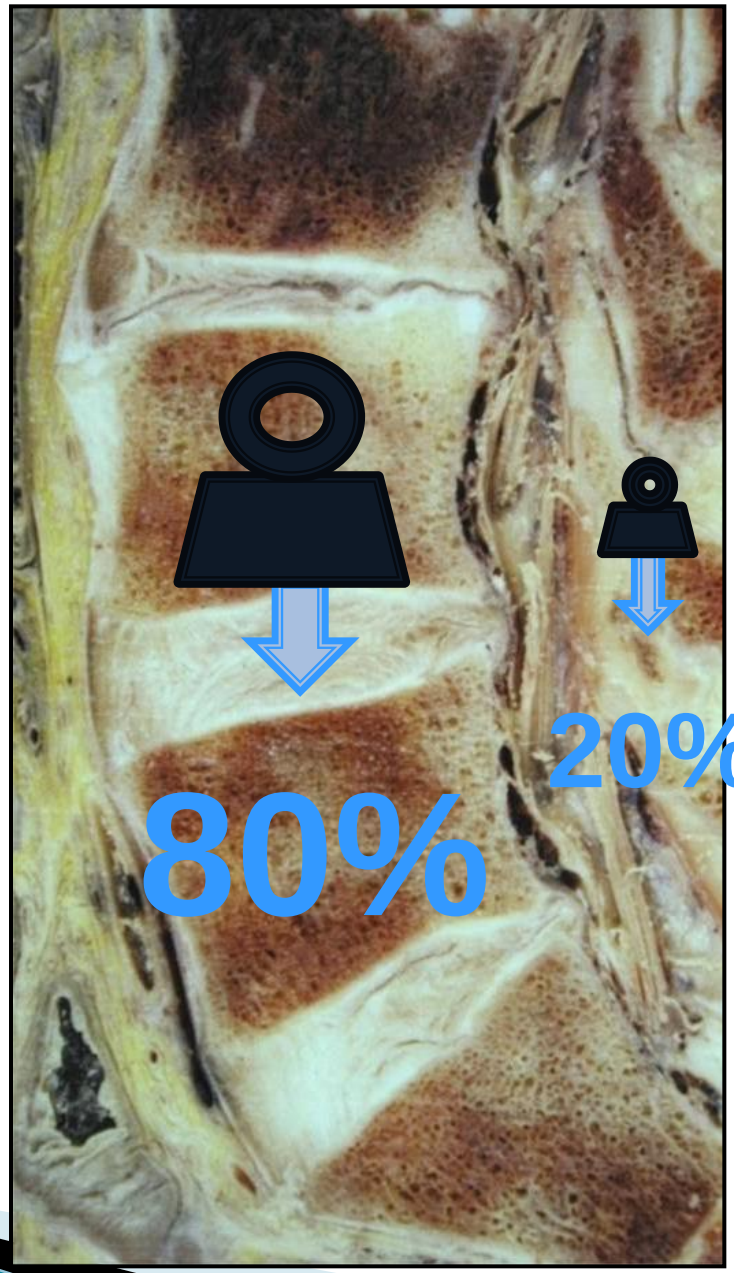


APL Postéro-latérale

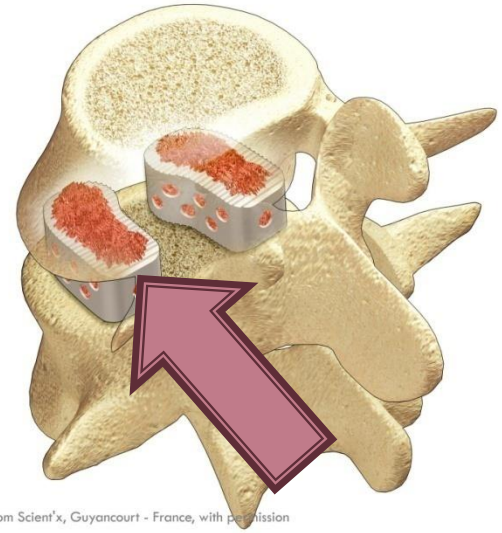


AIS Inter-somatique

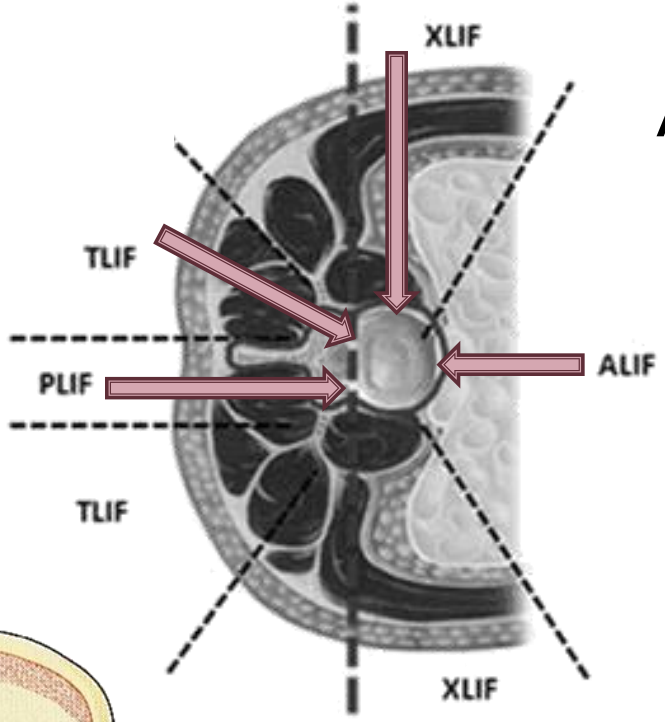
From Core knowledge in orthopaedics, VACCARO AR


80%
20%

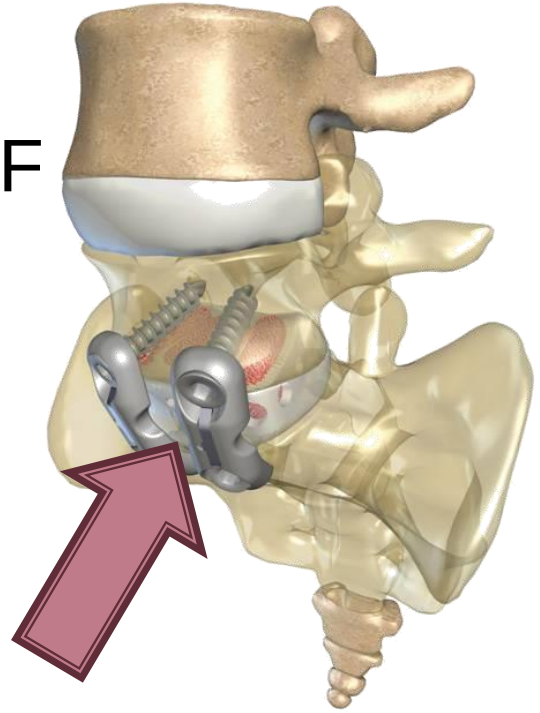
ALIF, PLIF, TLIF, XLIF…

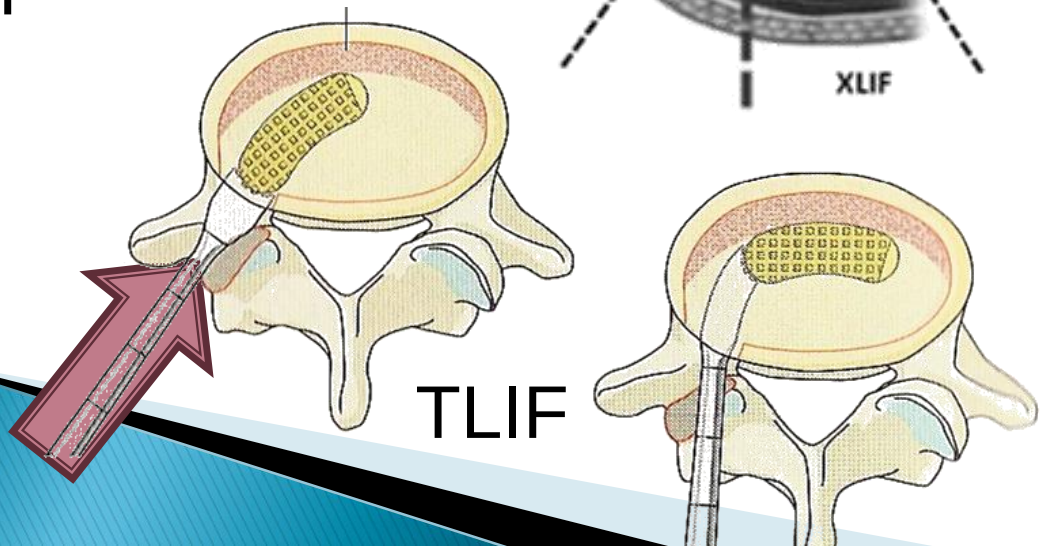


PLIF



ALIF





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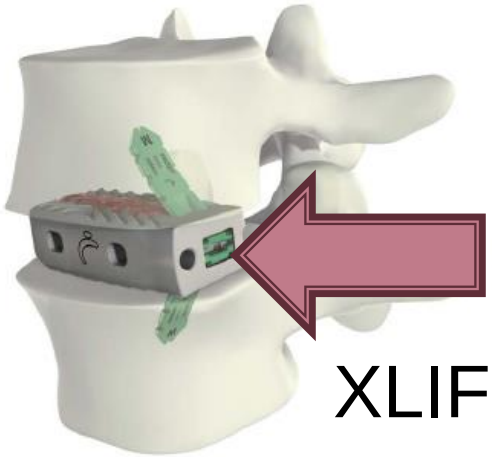
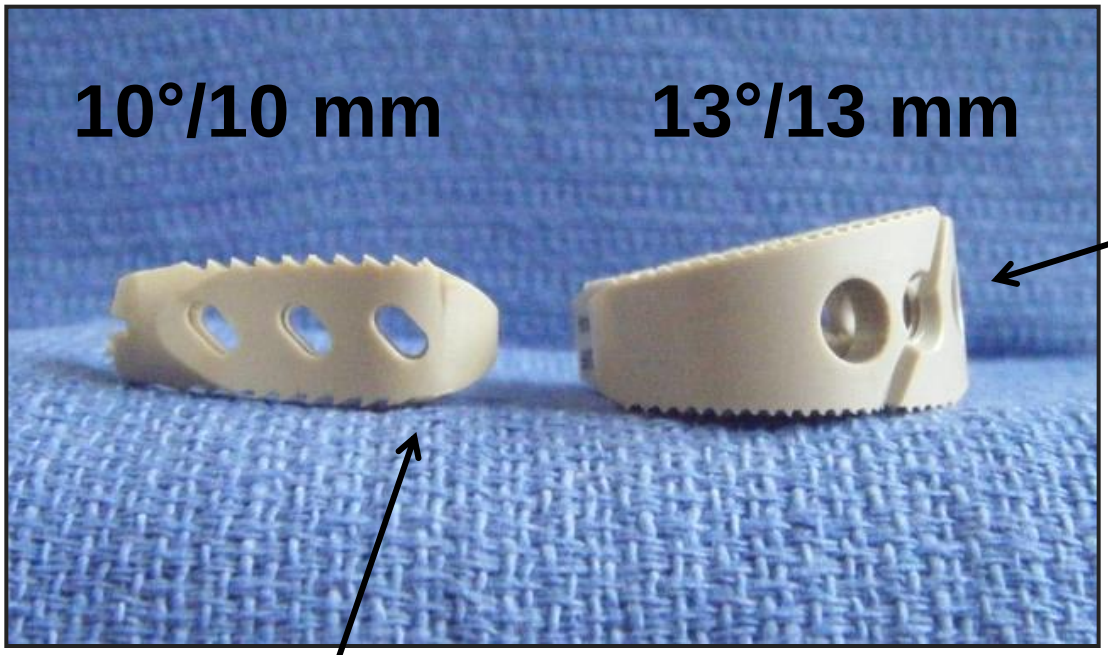


XLIF

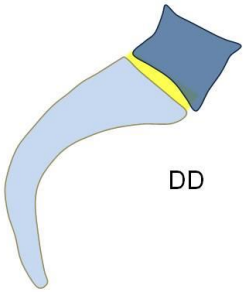


ALIF

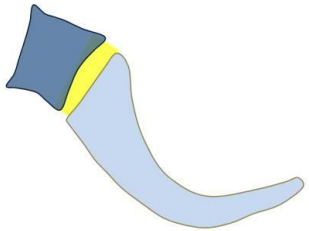
PLIF

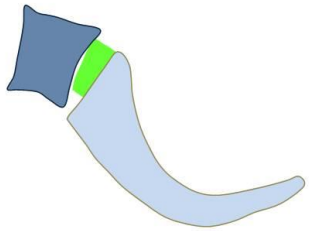
Abord combiné

0- Préopératoire en charge

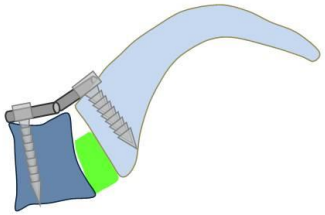


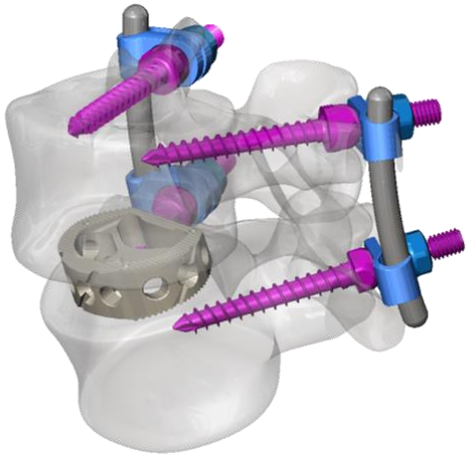
1- Tps ANT: Décubitus dorsal

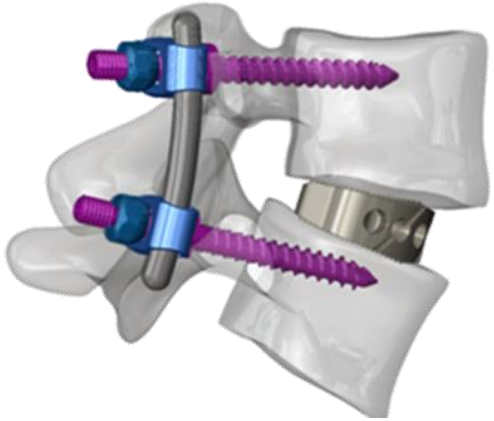


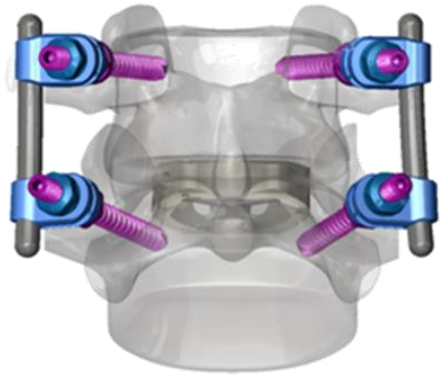


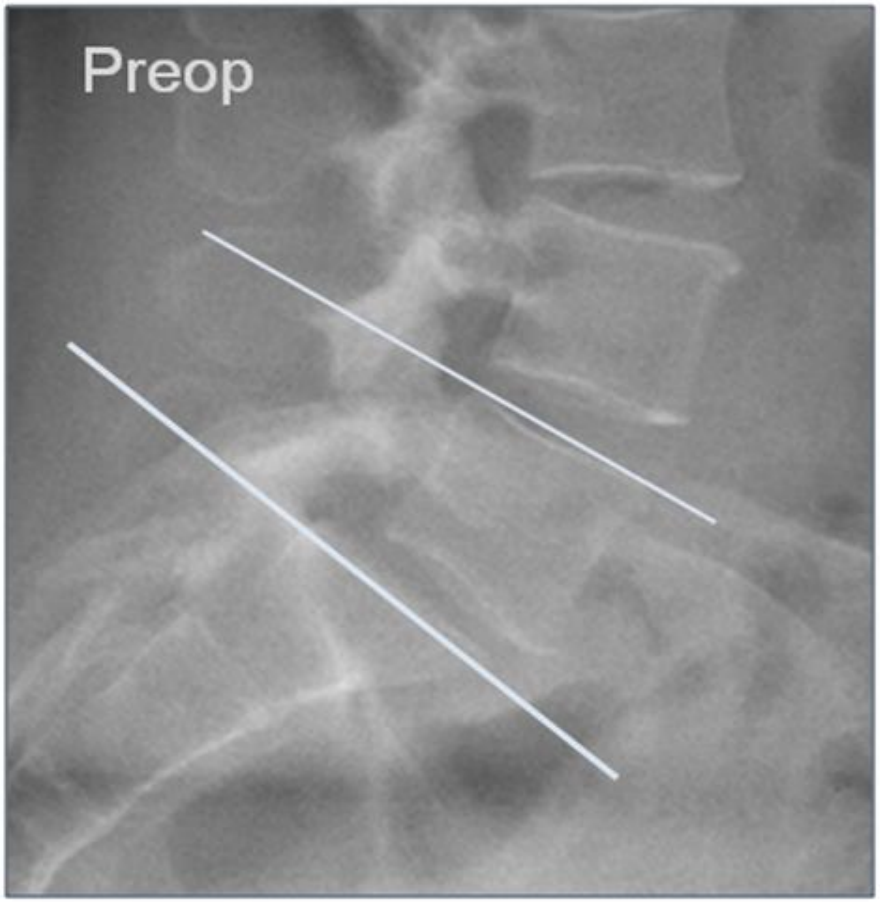
2- Tps POST: Décubitus ventral

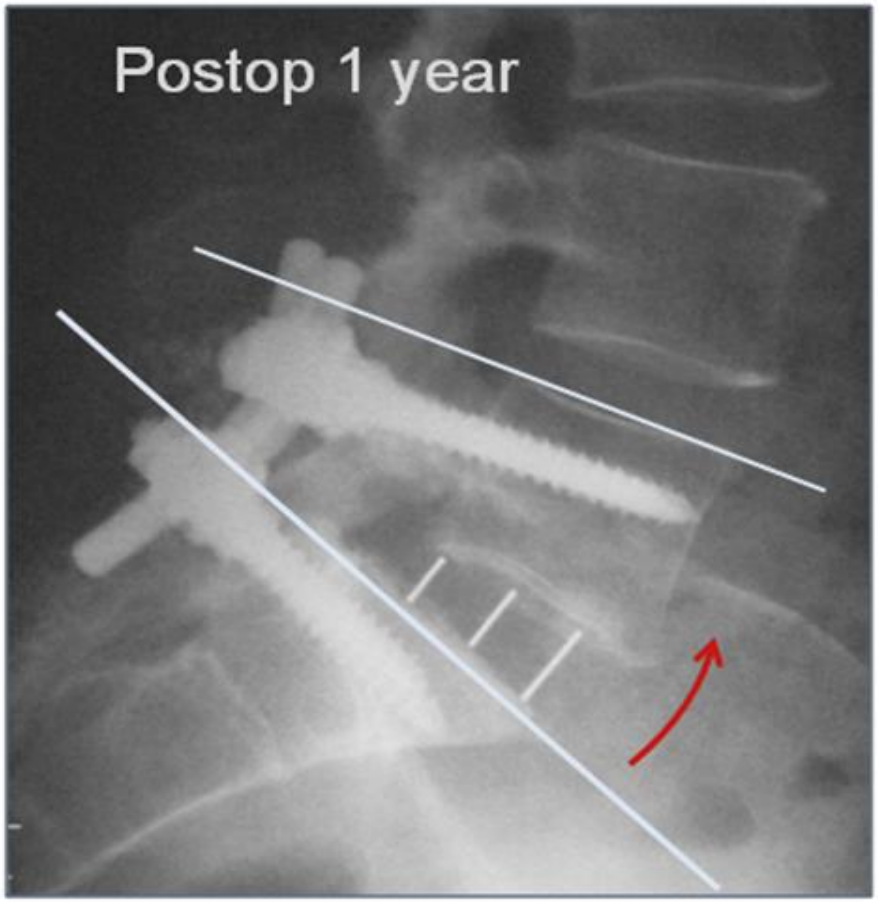


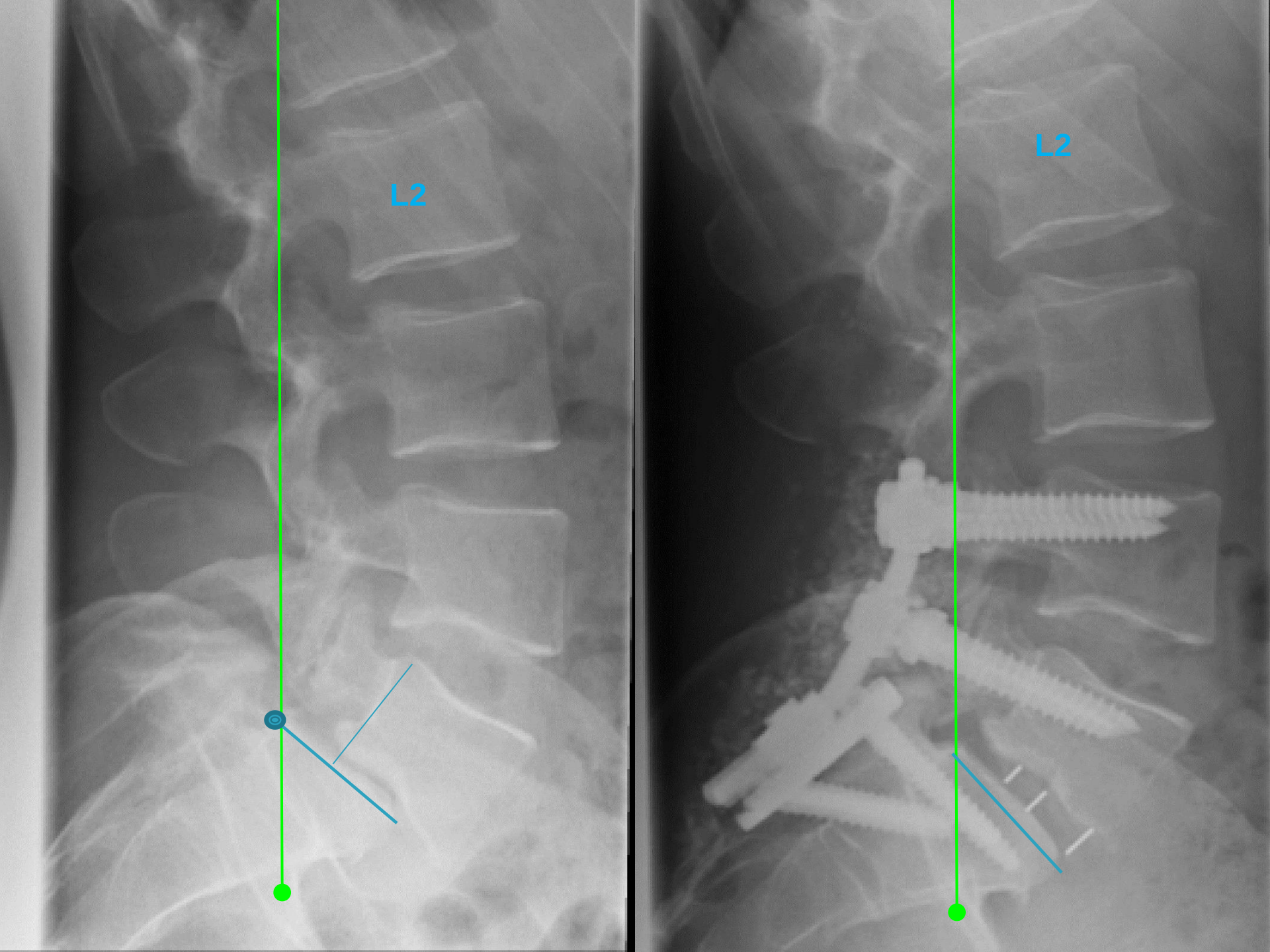






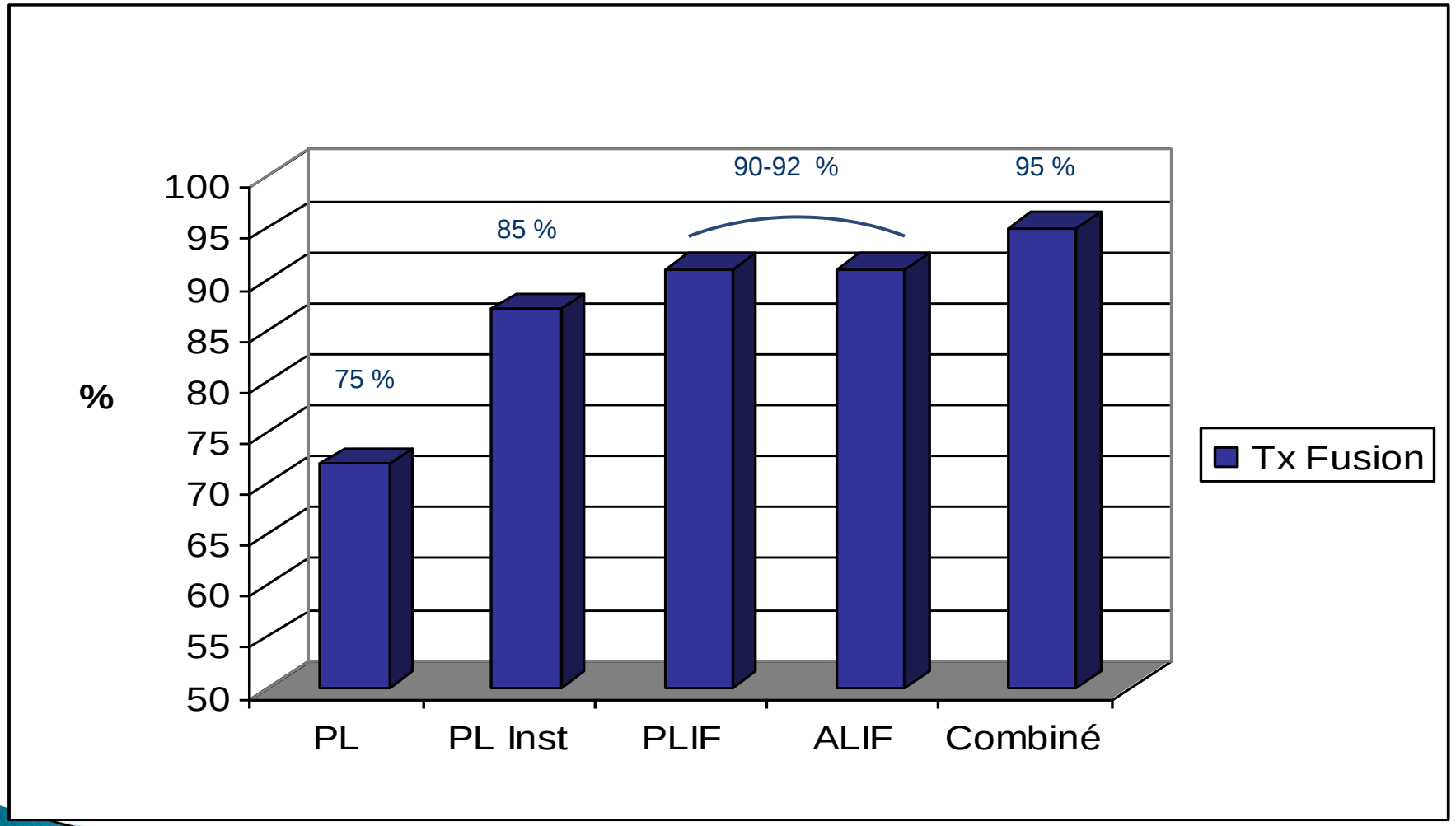

Preop


Postop 1 year


L2
L2


1 AN

Taux fusion selon procédure

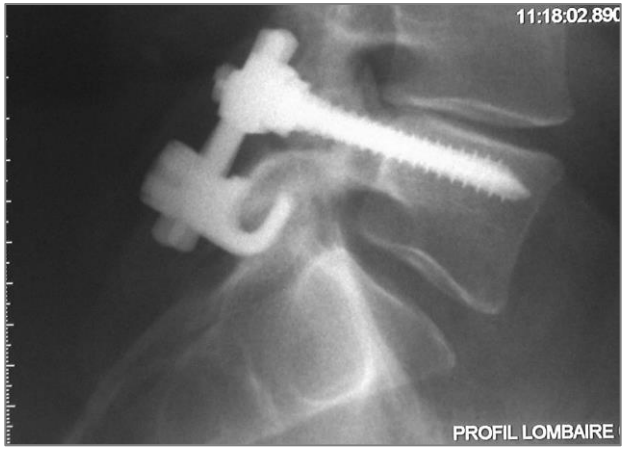


***Fritzell**, Spine 2002: Comparison of 3 surgical techniques*

Prospective multicenter randomized study

Réparation isthmique

- Lyse sans glissement
- Ostéosynthèse
- Nombreuses techniques
- Spondylolyse sans glissement avec disque normal



Indications chirurgicales

- Exigences du sportif de haut niveau

1- Arrêt de ses activités le plus court possible

2- Reprise à un même niveau de performance

- Techniques qui respectent au maximum les structures musculo-ligamentaires du rachis +++

- Techniques associées à un **haut taux de fusion**

- Reconditionnem^{t} progressif à l'effort post-op

Indications chirurgicales
La Hernie Discale

Avec un traitement **médical** adapté, la guérison est obtenue

dans environ **80-85%** des cas

après 6 à 8 semaines de traitement

Indications chirurgicales

Indiscutables en **Urgence** :

1- Syndrome de la queue de cheval : AUCUN RETARD

! Signes d'alarme

2- Sciatique déficitaire (testing < ou = 3/5; déficit sensitif sévère)

3- Sciatique hyperalgique (opiacés) : EXθL

Indications chirurgicales

Quand opérer ?

Indication consensuelle :

- Echec du traitement médical au-delà de 6 sem
  (1 patient sur 10)
- DELAI optimal entre 2 et 6 mois +++

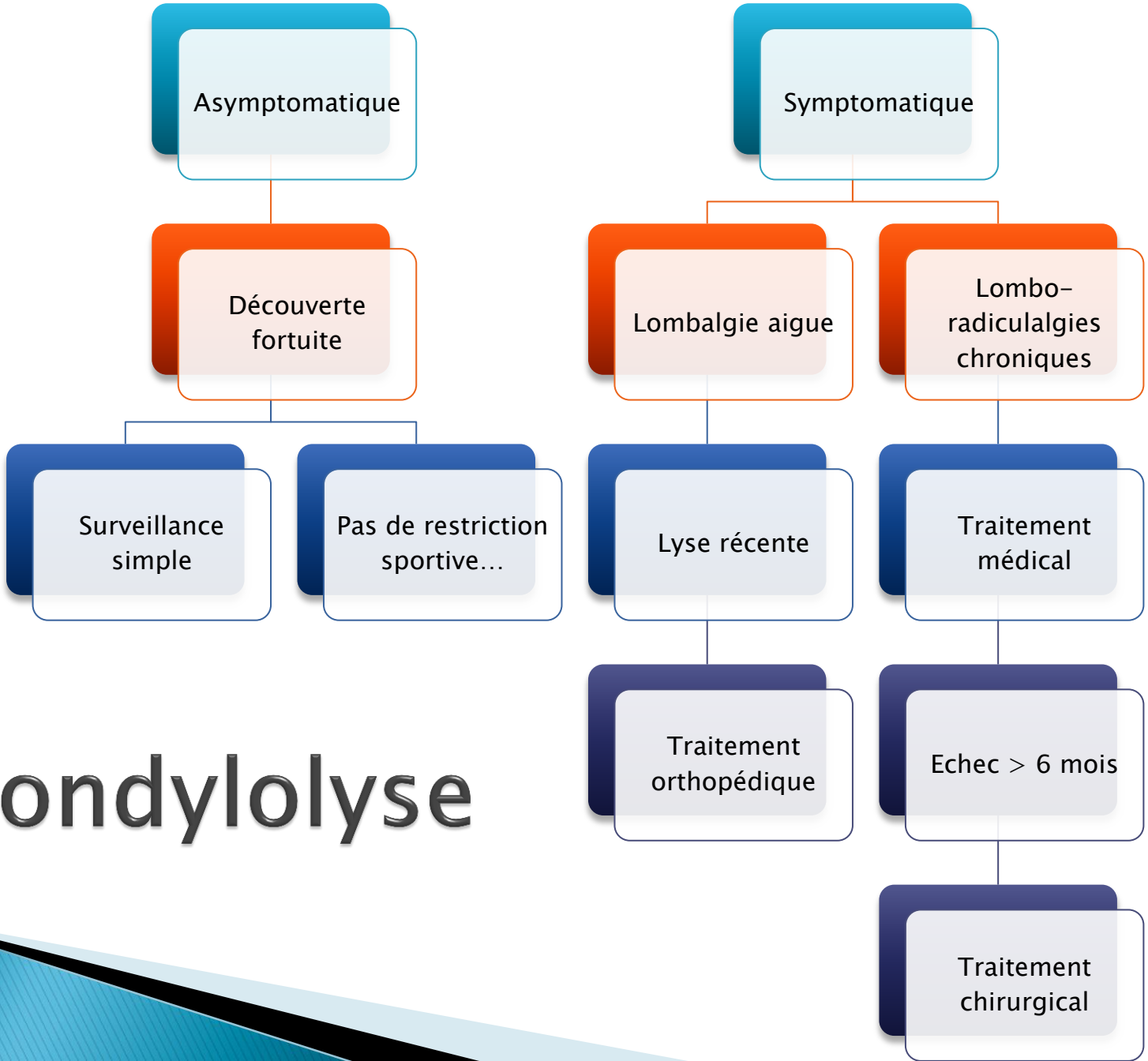
- Deux conditions:
  1) Bonne concordance radio-clinique
  2) Radiculalgie au 1er plan (>> lombalgie)

Objectifs de la chirurgie

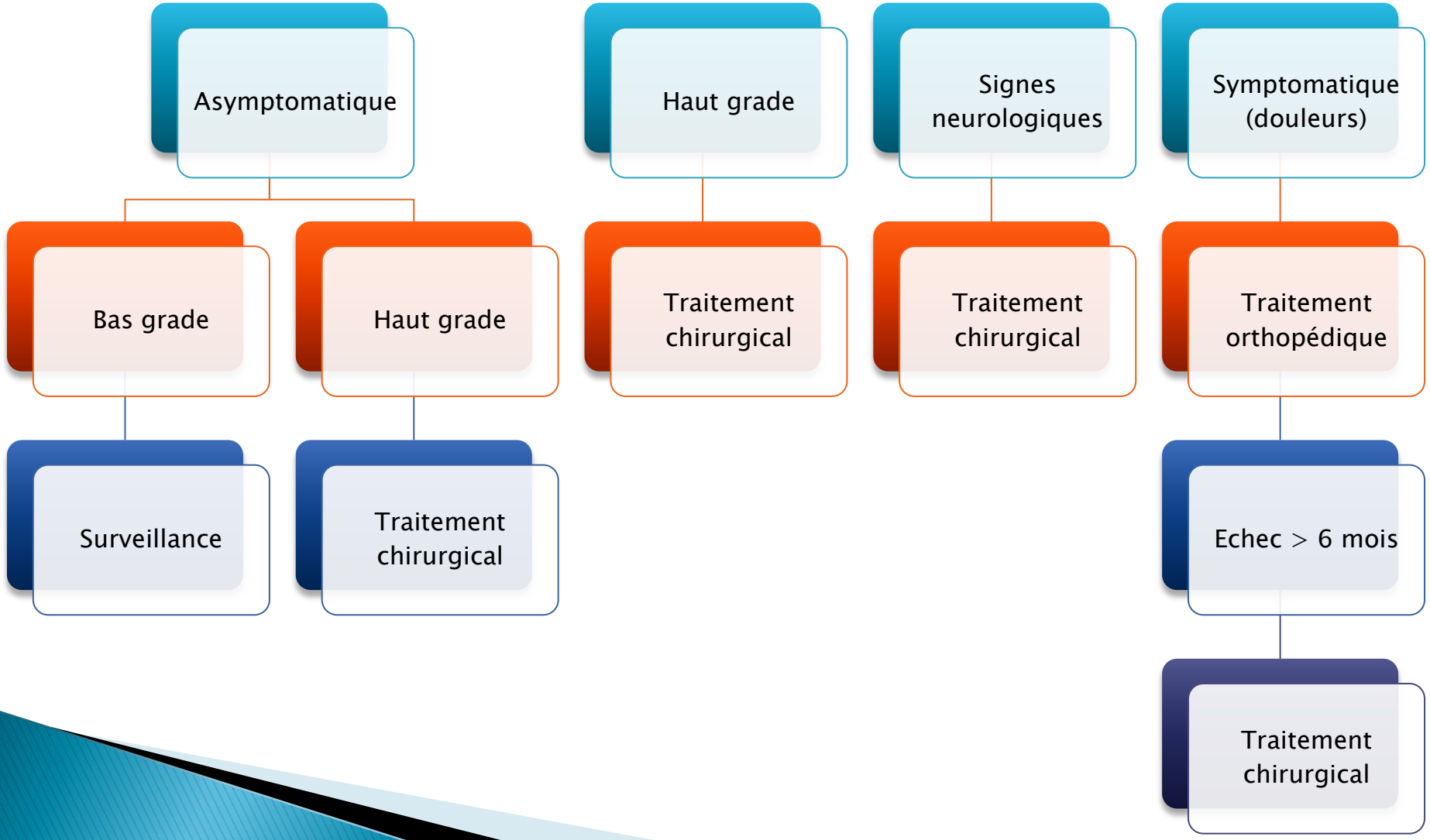
- Soulager la **douleur radiculaire**
- Favoriser la récupération neurologique en levant la compression de la racine nerveuse d'origine discale
- Pas de bénéfice à attendre sur le plan de la lombalgie

La chirurgie de la hernie discale lombaire est une technique simple et efficace qui apporte un soulagement de la douleur radiculaire dans plus de 85 % des cas. Le soulagement est généralement obtenu en postopératoire immédiat dès le réveil.

Spondylolyse



Spondylolisthésis



Reprise du sport

1) Quand ?
2) Comment ?
3) Pour quels résultats ?

Après chirurgie de hernie discale

Am J Sports Med. 2012 Nov;40(11):2530-5. doi: 10.1177/0363546512458570. Epub 2012 Sep 17.

Return-to-play outcomes after microscopic lumbar diskectomy in professional athletes.

Watkins RG 4th, Hanna R, Chang D, Watkins RG 3rd.

Marina Spine Center, Marina del Rey, California, USA. robertwatkinsmd@yahoo.com

Abstract

BACKGROUND: It has been shown a microscopic lumbar diskectomy (MLD) is effective in getting professional athletes back to their sport after a herniated nucleus pulposus (HNP). There is a need for more information on the time it takes professional athletes to return after surgery.

PURPOSE: To determine average time for return to play and success in returning to play for professional athletes undergoing MLD.

STUDY DESIGN: Case series; Level of evidence, 4.

n=85

METHODS: Between 1996 and 2010, the senior authors treated 171 professional athletes for lumbar HNP. A retrospective review was performed using patient charts, operative reports, team medical records, and internet search. Eighty-five patients were treated with MLD, and 86 patients were treated nonoperatively. This study focused on the return to play of the operatively treated patients. Primary outcome measures were return rate and average return time, considering only patients whose sport is in season at specific postoperative time points.

RESULTS: Of surgically treated patients, 89.3% returned to sport. The average time it took operative patients to return to their sport (return time) was 5.8 months. Progressive return data for surgically treated patients showed the percentage of athletes who returned increased from 50% at 3 months to 72% at 6 months to 77% at 9 months and 84% at 12 months.

CONCLUSION: The chance a player returns to play after MLD is 50% at 3 months, 72% at 6 months, 77% at 9 months, and 84% at 12 months. The overall chance of returning to play at any point is 89%.

84% de reprise à 1 an n=85

Après chirurgie de hernie discale

Spine (Phila Pa 1976). 1999 Mar 15;24(6):570-3.

The outcome of lumbar discectomy in elite athletes.

Wang JC, Shapiro MS, Hatch JD, Knight J, Dorey FJ, Delamarter RB.

Department of Orthopaedic Surgery, University of California, Los Angeles School of Medicine, USA. jwang@ortho.medsch.ucla.edu

STUDY DESIGN: An outcomes assessment of 14 elite college athletes who had undergone lumbar disc surgery was performed using the SF-36, a validated questionnaire that assesses quality of life.

OBJECTIVES: To determine the outcomes and results of lumbar disc surgery in an elite group of athletes and compare the results with those in the general population and in age-matched control subjects.

SUMMARY OF BACKGROUND DATA: Lumbar disc surgery is reported to be a highly successful procedure with excellent results. The outcome in elite athletes has not been assessed and compared with population norms and age-matched control subjects.

METHODS: Fourteen athletes from schools in the National Collegiate Athletic Association with a mean age of 20.7, underwent lumbar discectomy for radiculopathy refractory to conservative treatment. Ten had a single-level microdiscectomy, three a two-level microdiscectomy, and one a percutaneous discectomy. Patients were evaluated at a mean follow-up of 3.1 years, underwent a detailed clinical evaluation, and filled out the SF-36 questionnaire.

RESULTS: All 14 patients had improvement of pain with elimination of the radicular component, took less medication than before surgery, and returned to recreational sports. Nine patients, all with a single level microdiscectomy, returned to varsity sports. Five athletes prematurely retired from competitive sports because of continued symptoms. Three of the athletes who retired underwent two-level procedures, and one had a percutaneous discectomy. SF-36 scores for bodily pain, physical role, and social and mental health roles were significantly lower in those athletes who retired. Patient scores were also compared with those in a group of noninjured age-and sport-matched college athletes. There were no differences between injured and noninjured athletes, but both groups had scores significantly lower than normal values in an age-matched group for bodily pain, physical role, general health, and social function.

CONCLUSIONS: All patients were satisfied with their surgeries, were greatly improved, and were pain free in activities of daily living. For a single-level microdiscectomy, the success rate in elite athletes is excellent, with 90% of athletes able to return to a high level of competition. Two-level disease may be associated with a less favorable outcome.

n=3

Après chirurgie de hernie discale

Orthopedics. 2008 Aug;31(8):756.

Sporting activity following discectomy for lumbar disc herniation.

Dollinger V, Obwegeser AA, Gabl M, Lackner P, Koller M, Galiano K.

Department of Neurosurgery, Anichstrasse 35, 6020 Innsbruck, Austria.

Sportifs amateurs

Abstract

The aim of this study was to investigate to what extent patients could resume physical activity following surgery for herniated lumbar disks. We analyzed a cohort of 1003 patients who underwent lumbar spine surgery within 1 year. Out of this cohort, 93 patients were selected according to our inclusion criteria (age 20-35 years, mediolateral single level disk herniation, no comorbidity at the lumbar spine, and treatment with conventional subtotal diskectomy). This group was evaluated after a minimum follow-up of 28 months in a telephone questionnaire; participants were questioned about pre- and postoperative physical activities. The questionnaire was answered by 67 patients. Twenty-six patients were lost to follow-up because they had relocated. The follow-up group had a mean age of 30 years. Five patients underwent a second procedure due to recurrent disk herniation. All patients showed a pain reduction. At follow-up, no patient needed constant pain medication. Eighty-two percent of the patients were pain free during practicing sports. Sixty-two patients performed some type of sport after surgery. Concerning the type and frequency of physical activities, no significant change between pre- and postoperative behavior occurred. The 5 patients with recurrent disk herniation did not behave differently. Single-level lumbar disk surgery does not limit or compromise sportive activity in young people.

92,5% de reprise du sport +++

Après réparation isthmique

THE JOURNAL OF BONE & JOINT SURGERY (BRITISH)

Clinical outcome and return to sport after the surgical treatment of spondylolysis in young athletes

U. K. Debnath, B. J. C. Freeman, P. Gregory, D. de la Harpe, R. W. Kerslake, J. K. Webb

From the University Hospital, Nottingham, England

Abstract

We studied prospectively 22 young athletes who had undergone surgical treatment for lumbar spondylolysis. There were 15 men and seven women with a mean age of 20.2 years (15 to 34). Of these, 13 were professional footballers, four professional cricketers, three hockey players, one a tennis player and one a golfer. Preoperative assessment included plain radiography, single positron-emission CT, planar bone scanning and reverse-gantry CT. In all patients the Oswestry disability index (ODI) and in 19 the Short-Form 36 (SF-36) scores were determined preoperatively, and both were measured again after two years in all patients. Three patients had a Scott's fusion and 19 a Buck's fusion. The mean duration of back pain before surgery was 9.4 months (6 to 36). The mean size of the defect as determined by CT was 3.5 mm (1 to 8) and the mean preoperative and postoperative ODIs were 39.5 (SD 8.7) and 10.7 (SD 12.9), respectively. The mean scores for the physical component of the SF-36 improved from 27.1 (SD 5.1) to 47.8 (SD 7.7). The mean scores for the mental health component of the SF-36 improved from 39.0 (SD 3.9) to 55.4 (SD 6.3) with $p < 0.001$. After rehabilitation for a mean of seven months (4 to 10) 18 patients (82%) returned to their previous sporting activity.

82% de reprise du sport
Avec un délai moyen de 7 mois

Table II. The number of athletes who returned to sport after surgery

Sport	Number returning to preinjury status	Number who failed to return to sport
Footballers (13)	12	1
Cricketers (4)	4	-
Hockey players (3)	1	2
Tennis players (1)	-	1
Golfer (1)	1	-

Après arthrodèse

Am J Sports Med. 2013 Nov;41(11):2604-8. doi: 10.1177/0363546513499229. Epub 2013 Aug 16.

Performance-based outcomes after nonoperative treatment, discectomy, and/or fusion for a lumbar disc herniation in National Hockey League athletes.

Schroeder GD[1], McCarthy KJ, Micev AJ, Terry MA, Hsu WK.

Author information

Abstract

BACKGROUND: Ice hockey players have a high incidence of lumbar spine disorders; however, there is no evidence in the literature to guide the treatment of an ice hockey player with a herniated lumbar disc.

PURPOSE: To determine the performance-based outcomes in professional National Hockey League (NHL) athletes with a lumbar disc herniation after either nonsurgical or surgical treatment.

STUDY DESIGN: Descriptive epidemiological study.

METHODS: Athletes in the NHL with a lumbar disc herniation were identified through team injury reports and archives on public record. The return-to-play rate, games played per season, points per game, and performance score for each player were determined before and after the diagnosis of a lumbar disc herniation. Statistical analysis was used to compare preinjury and postinjury performance measures for players treated with either nonsurgical or surgical treatment.

RESULTS: A total of 87 NHL players met the inclusion criteria; 31 underwent nonoperative care, 48 underwent a discectomy, and 8 underwent a single-level fusion. The return-to-play rate for all players was 85%. There was a significant decrease in performance in all players after a lumbar disc herniation in games played per season, points scored per game, and performance score. A comparison of the posttreatment results for the nonsurgical and surgical patient groups revealed no significant difference in performance measures. Notably, the lumbar fusion group did not show a decrease in games played per season or performance score after surgery, likely secondary to a small sample size.

Pas d'impact du type de chirurgie (HDL vs fusion)

CONCLUSION: National Hockey League players with a lumbar disc herniation have a high return-to-play rate regardless of the type of treatment; however, performance-based outcomes may decrease compared with preinjury levels. The study data suggest that a lumbar fusion is compatible with a return to play in the NHL, which is in contrast to other professional sports.

CONCLUSION

- Pronostic après chirurgie plutôt bon (85% de reprise)
- Indications relativement similaires à celles de la population générale
- Encadrement post-opératoire idéalement mis en place en collaboration avec un centre de rééducation fonctionnelle

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