SFNM 2025
9ème symposium

Les douleurs chez le blessé médullaire

Place des techniques d'analgésie intrathécale et des techniques lésionnelles

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Centre de Recherche Neurosciences Lyon

Douleurs des lésions médullaires

- *81% des patients victimes de lésions médullaires souffrent de douleurs*

- *58% expriment des douleurs sévères insuffisamment améliorées par les traitements*

A longitudinal study of the prevalence and characteristics of pain in the first 5 years following spinal cord injury.
Siddall P. Pain 2006

➔ Il existe une place pour des approches complémentaires

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1. Particularités du patient neuro-handicapé
2. Techniques invasives à disposition
   - IT
   - Techniques lésionnelles
3. Principes des indications

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1- Particularités du patient neuro-handicapé

Évaluation de la douleur

- Mécanismes des douleurs neuropathiques à définir (⚠ Pièges)

🡐Atteintes du système nerveux somesthésique <u>central et/ou périphérique</u>
🡐Étiologies des douleurs:
Lésion initiale et son évolution
Lésions secondaires
Indépendamment du handicap initial

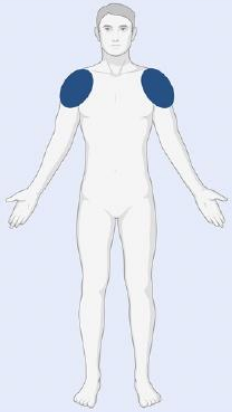
- Retentissements sur qualité de vie dans un contexte de handicap +++

➔Évaluation multi-dimensionnelle

Douleurs nociceptives du blessé médullaire

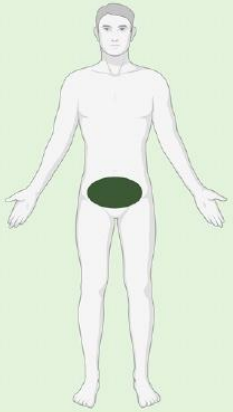
Musculoskeletal Pain

- Located in joints and muscles
- Dull or aching
- Initiated or aggravated by movement
- Tenderness upon palpation
- Often improves with anti-inflammatory medications



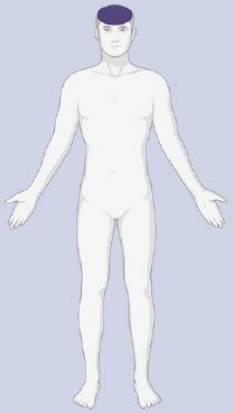
Visceral Pain

- Located in thorax, abdominal or pelvic areas
- Initiated or aggravated by e.g., eating or constipation, urinary tract infections, visceral pathology



Other Nociceptive Pain

- Not musculoskeletal or visceral pain
- Unrelated or indirectly related to SCI (e.g., pressure sores, autonomic dysreflexia headache, or migraine)



American Pain Society
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The Journal of Pain, Vol 15, No 1 (January), 2014: pp 40-48
Available online at www.jpain.org and www.sciencedirect.com

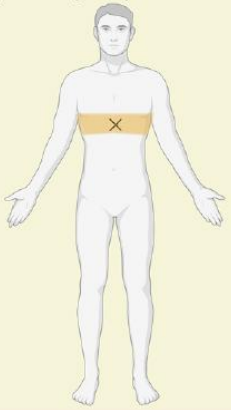
Phenotypes and Predictors of Pain Following Traumatic Spinal Cord Injury: A Prospective Study

Nanna Brix Finnerup,* Cecilia Norrbrink,† Katarzyna Trok,† Fredrik Piehl,†
Inger Lauge Johannesen,‡ Jens Christian Sørensen,† Troels Staehelin Jensen,*,¶
and Lars Werhagen†

Douleurs neuropathiques du blessé médullaire

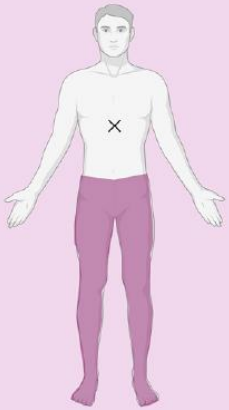
At level neuropathic pain

- Located at the neurological level of injury or within three dermatomes below this level
- Caused by a lesion or disease of a nerve root (peripheral neuropathic pain) or the spinal cord (central neuropathic pain)



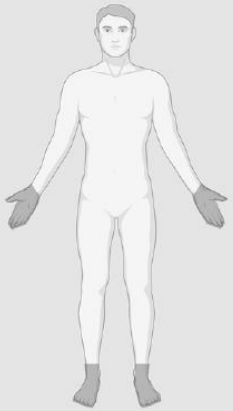
Below level neuropathic pain

- Located more than 3 dermatomes below the neurological level of injury (NLI) or extend between the NLI and extend further than three dermatomes below the NLI
- Complete or incomplete SCI



Other neuropathic pain

Can be located anywhere in the body and does not have a direct causal link to the SCI (e.g., postherpetic neuralgia, diabetic neuropathy pain, carpal tunnel syndrome, or central post-stroke pain)



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1- Particularités du patient neuro-handicapé

Traitement préalable des co-morbidités- interactions :

- HTA, diabète, épilepsie…
- Traitements anticoagulants…
- Foyers septiques
- Épines irritatives diverses
- Problème de nutrition
- …

➔ **Interactions avec les équipes de MPR +++**

1- Particularités du patient neuro-handicapé

Communication adaptée avec patient et l'entourage

1- Définir les objectifs du traitement / Handicap

= Soulagement…

2- S'assurer de la compréhension du rapport bénéfices / risques (difficultés de communication)

➔Décision partagée

= Contrat thérapeutique

Les douleurs chez le blessé médullaire

Place des techniques d'analgésie intrathécale et des techniques lésionnelles

1. Particularités du patient neuro-handicapé
2. Techniques invasives à disposition
   - Infusion intrathécale
   - Techniques lésionnelles
3. Principes des indications

2. Techniques invasives à disposition

1. **« Anatomiques »** = Réparation anatomique

2. **Neuromodulation**

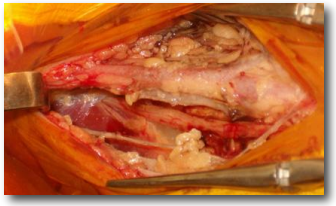
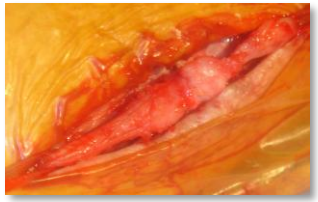
3. **Lésions hypersélectives**

dirigées vers des cibles reconnues comme participantes aux mécanismes algogènes

1- *Traitements anatomiques*
Exemples

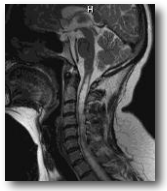
- **Nerfs périphériques**
  - Décompression dans les syndromes canalaires (Canal carpien…)
  - Transposition (Nerf ulnaire au coude…)
  - Réparation (Suture, greffe…)
  - Excision névrome

  etc…

- **Racines spinales, moelle spinale**
  - Décompression radiculaire
  - Stabilisation rachidienne
  - Traitement d'une compression médullaire
  - Drainage syringomyelie, libération des espaces sous-arachnoïdien

  etc…




Neuromodulation
Méthodes

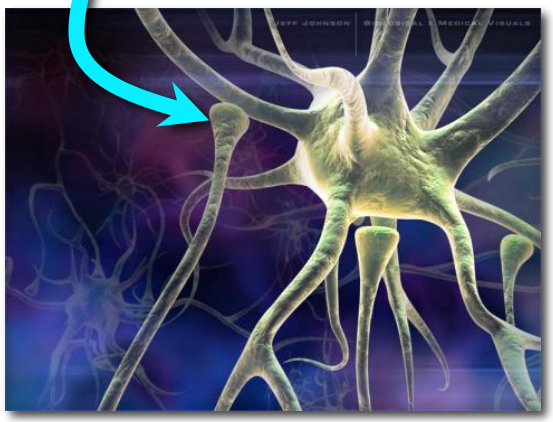
- Traitements pharmacologiques
- Techniques physiques
- Infiltrations - Blocs
- RTMS- TdCS
- Techniques implantées de Neuromodulation :

  - par diffusion intrathécale de molécules antalgiques

  - par neurostimulations électriques

Neuromodulation par infusion intrathécale Principes

- Court-circuiter la barrière hémato-nerveuse en administrant des molécules aptes à moduler le système nociceptif à proximité de leurs récepteurs



-Augmenter l'efficacité
-Diminuer les doses délivrées
-Diminuer les effets secondaires systémiques

Infusion intrathécale d'antalgiques
Molécules utilisables AMM

- Opioïdes : Morphine, Hydromorphone, Fentanyl
- Anesthésiques locaux (bloc canaux sodiques) : Bupivacaïne
- Bloqueurs des canaux calciques : Ziconotide
- Agoniste adrénergique : Clonidine
- Gaba-B agoniste : Baclofen

Douleur de cancer : Morphine et / ou Ziconotide et / ou AL

Douleur neuropathique : Ziconotide

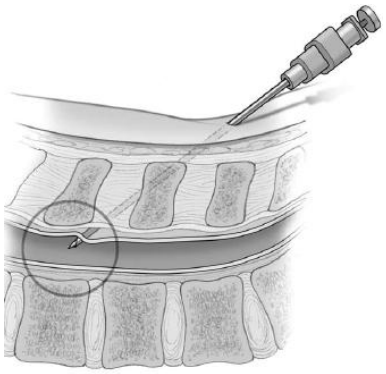
Douleur en relation avec la spasticité : Baclofen

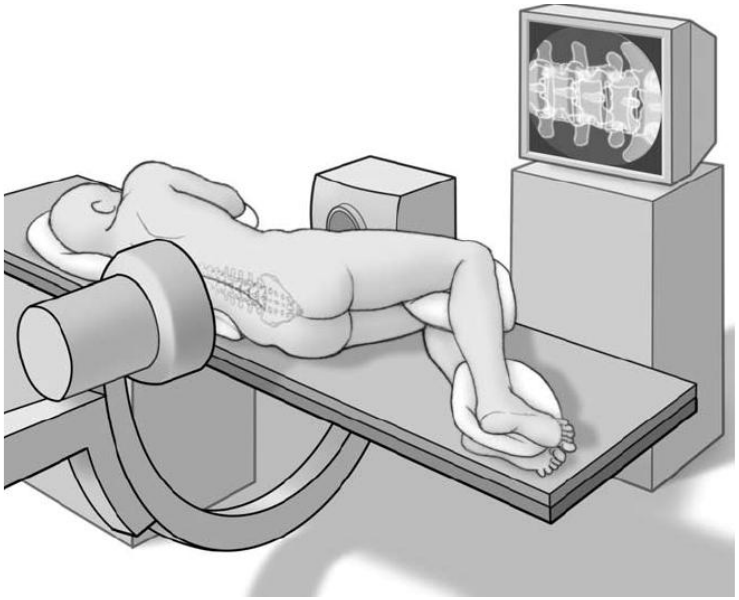
Système d'infusion intrathécale
Indications - Généralités

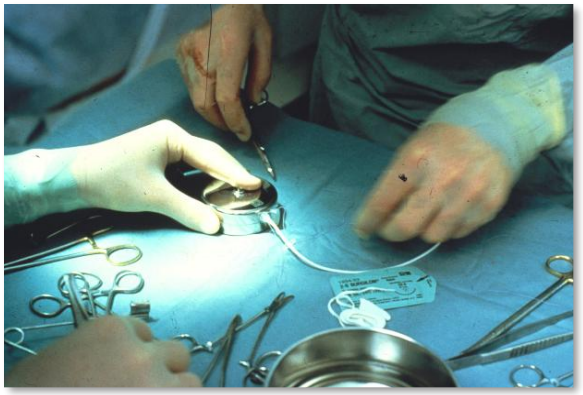
- Patients avec douleurs diffuses
- Évaluation psychologique : pas d'antécédents d'addiction, ni de troubles psychiatriques
- Réponse positive à un test préalable d'injection intrathécale (Bolus ou infusion cont. par pompe ext.)
- Capable d'un suivi au long cours pour remplissages itératifs

Si tests positifs :
Implantation chirurgicale d'une pompe d'injection chronique

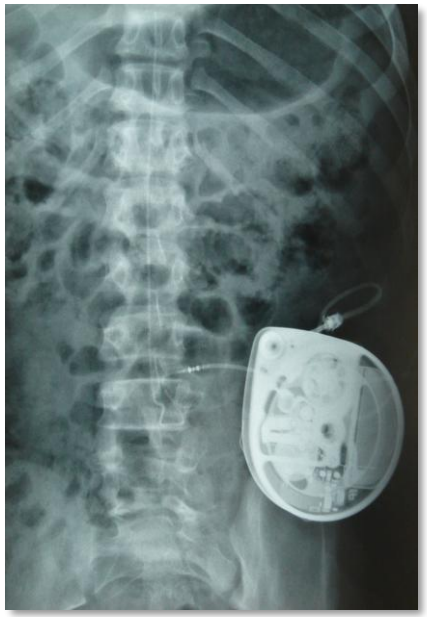
Aiguille de TUOHY







Technique simple mais rigoureuse



Système d'infusion intrathécale
Facteurs influençants la diffusion

1. Qualité du flux de LCS (blocage ?)
2. Position de l'extrémité du cathéter
3. (au-dessus du niveau lésionnel)
4. Molécule(s) utilisée : poids moléculaire, hydrophylie et lipophylie
5. Dose journalière
6. Mode d'administration : continu – bolus…
7. Volume d'injection

Neuromodulation: Technology at the Neural Interface

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The Polyanalgesic Consensus Conference (PACC)®: Intrathecal Drug Delivery Guidance on Safety and Therapy Optimization When Treating Chronic Noncancer Pain

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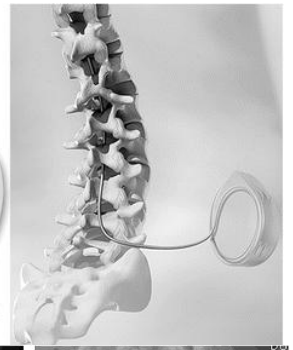
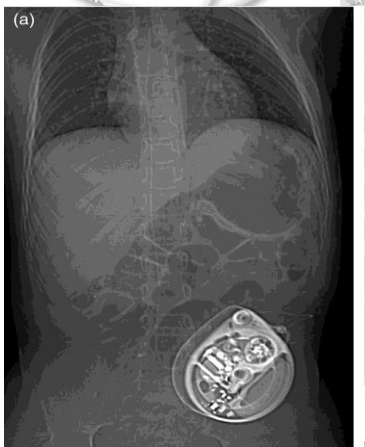
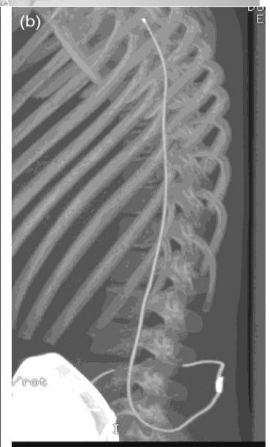
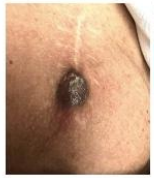


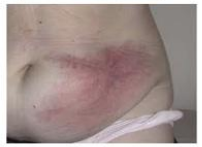




Système d'infusion intrathécale Complications

- Catheter : 9- 16%
- Défaut de cicatrisation : 4%
- Infection : 8%
- Effets secondaires des drogues : 15%
- Accident de sur – sous dosage : 0.3%





Neuromodulation: Technology at the Neural Interface

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Best Practices for Intrathecal Drug Delivery for Pain

Joshua Prager, MD, MS*; Timothy Deer, MD†; Robert Levy, MD, PhD‡; Brian Bruel, MD, MBA§; Eric Buchser, MD¶; David Caraway, MD, PhD**; Michael Cousins, MD††; Marilyn Jacobs, PhD, ABPP‡‡; Gail McGlothlen, APRN-BC CNS§§; Richard Rauck, MD¶¶; Peter Staats, MD***; Lisa Stearns, MD†††

- 9 cas de complications fatales associées aux infusions IT d'opioïdes (dépression respiratoire) étudiés par Coffey et al. : les patients prenaient entre un et neuf médicaments concomitants

- 3 cas de décès par sevrage aiguë de baclofen

Intrathecal Morphine
Results - literature

- **Neuropathic Pain** – IT Morphine

  Review by *Rowbothan et al., 2013* :

  No long term constant positive responses

  Satisfactory level of analgesia in

  35% Peripheral neuropathic pain

  18% Central neuropathic pain

  Tolerance to all the opioids has been a significant problem with intrathecal delivery

  Actually, very few indications

Table 1. Incidence and Management of Side Effects Associated With Intrathecal Morphine Therapy.

Side Effect	Incidence	Treatment
Pruritus	0–100% (32) 14% for long-term ITT (33)	Treatable with mu antagonist naloxone
Nausea and vomiting	30% with acute ITT (32) ~21% in long-term ITT (33)	Antiemetics Improved by lowering dose
Urinary retention	42% (34) to 80% (35) ~3% in long-term ITT (33) Dose dependent More common in men with enlarged prostates	Cholinomimetic agents (e.g., bethanechol or distigmine [used in the UK]); catheterization if medication is ineffective
Constipation	30% (33)	Stool softener, bowel stimulant or laxatives
Edema (preexisting venous insufficiency and edema are relative contraindications to intrathecal therapy (38))	3% (33) to 16% (36)	Leg raising, elastic stockings, compressive air pumps, salt and fluid restrictions, diuretics
Mental status change (sedation and lethargy, paranoid psychosis, catatonia, euphoria, anxiety, delirium, hallucination)	10–14% in long-term ITT (33)	Lower opiate dose first Treat sedation with psychostimulants (modafinil) or neuroleptics (haloperidol)
Sexual dysfunction	68.8% in women, 95.8% in men (38) Due to opioid-induced hypogonadism	Lower opiate dose Rotate opioids Prescribe hormone replacement therapy
Respiratory depression	Cause of some fatalities soon after the start of ITT	Start ITT with low dose Monitor vulnerable patients for 24 hours after start or change of ITT (25) Readily reversed with naloxone or nalbuphine

Adapted from Ruan X. *Pain Physician*. 2007;10:357–365. ITT, intrathecal therapy.

+ Hyperalgésie :**Hyperalgesia induced by low-dose opioid An observational case-control study. Hina et al.** Eur J Anaesthesiol. 2015.

Heat tolerance threshold (47.1°C vs. 48.4°C; P = 0.045), duration of tolerance to a 47°C stimulus (40.2 vs. 51.1 s; P = 0.03) and mechanical temporal summation [1.79 vs. 1.02 (ΔNRS10-1); P = 0.036].

Clonidine intrathécale

- Alpha-2 agoniste adrénergique (inhibiteur de la transmission glutamaergique)
- Adjuvant en anesthésie régionale (péridurale)
- Pas d'AMM en IT
- Retentissement hémodynamique à gérer

Clonidine for management of chronic pain: A brief review of the current evidences.
Kumar A, Maitra S, Khanna P, Baidya DK.
J Anaesth. 2014

Thirty clinical studies provides some evidence that clonidine administered through epidural, intrathecal and local/topical route may be effective in chronic pain conditions where neuropathy is a predominant component. It may also be effective where opioids are of limited use due to inadequate pain relief or adverse effects.

Baclofen intrathécal

Literature review
94 publications selected 1984-2012 Medline,
Cochrane databases

- Pour le traitement de la spasticité diffuse chez le blessé médullaire
  Ashworth Score decrease
    2, 6 levels for lower limbs - 1 level for upper limbs
  Spasms decrease 2,2 levels Penn score

- Les douleurs (musculo-squelettiques) en relation avec la spasticité :
  ↓ 86% patients

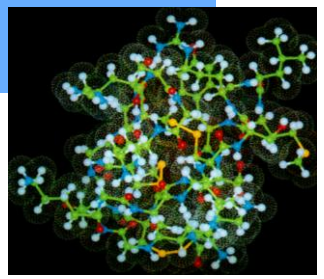
- Pas d'évidences d'efficacité directe sur les douleurs neuropathiques

(some cases series +) mais diminue l'exacerbation des DN par la spasticité
➔ utilisé en association avec Ziconotide

- Diminution des désordres dysautonomiques (utilisation précoce)

Becker et al. J. Neurol 1997,244:160-166
Cuny et al. Brain injury 2001, 15:917-925

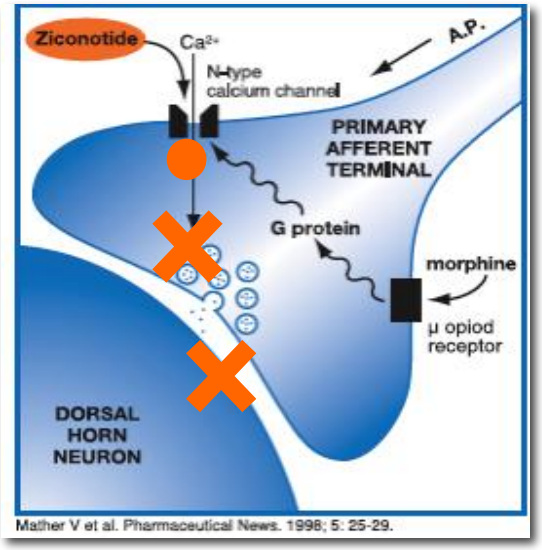
Intrathecal Ziconotide
Prialt®



Prialt® Analogue synthétique du neuropeptide ω- conopeptide MVII A

Peptide de 25 acides aminés comportant trois ponts disulfures, appartenant au groupe des conotoxines

Bloqueur de canaux Ca++ :
inhibition des neurotransmetteurs libérés par les afférences présynaptiques (mécanisme non opioïde)

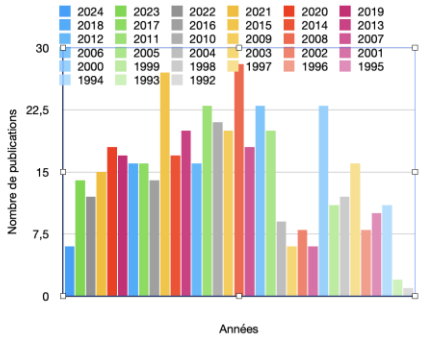


Prialt – Indications potentielles dans les douleurs neuropathiques chroniques réfractaires

Peu de données dans la littérature :

Saulino *Spinal cord 2007* (case reports + hydromorph)
Eur J Rehab Med 2009 (case reports + baclo)

Rauck RL et al. *Pain Pract 2009 (Review)*
« Twenty-eight articles : 5 were preclinical studies and 23 were clinical studies.
In the preclinical studies, ziconotide demonstrated antiallodynic effects.
Data from double-blind, placebo-controlled (DBPC) trials indicated that
pain score reported a mean percent improvement with ziconotide monotherapy
that ranged from 15.7% to 31.6% »

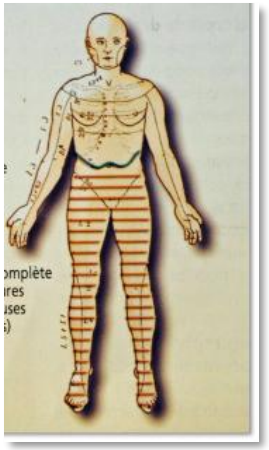


Shao, M.Met al. *World Neurosurg. 2021*, Effect of First-Line Ziconotide Intrathecal Drug Therapy for Neuropathic Pain on Disability, Emotional Well-Being, and PainCatastrophizing. 14 patients- 7 responders with long-term follow-up.

- Lésions nerfs périphériques
  étendues (après échec stimulation médullaire)
  post-traumatique , neuropathie, plexuelle…

- Lésions moelle spinale
  Douleurs lésionnelles et sous lésionnelles +++

- Lésions encéphaliques ? (peu de données)



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ORIGINAL ARTICLE

EJP European Journal of Pain WILEY

Ziconotide for spinal cord injury-related pain

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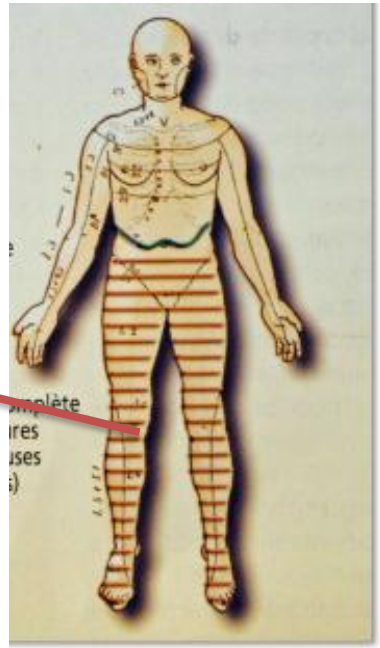
Potential option for treatment of

Pain in the area below the spinal lesion :

refractory chronic pain+++



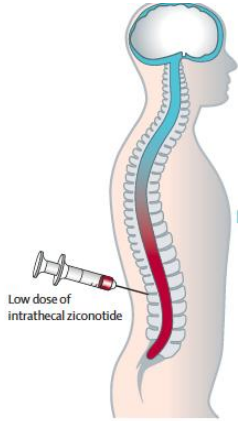
Material - Method

- 20 patients with spinal cord injury (5 cerv., 12 tho., 3 conus)
- 15 males, 5 females, 48 years old on av.
- ITZ test protocol :

  - lumbar puncture / 3 days :

  1-1.5 - 2 µg + random placebo

  - then continuous infusion (+ 0.5µg / 2 days)
- Consider as responder : ↓VAS baseline > 40%



Titration du ziconotide
Progressive !

- **Personnelle** : début 0,5 µg puis ➚ 0,5 µg /48h mode continue

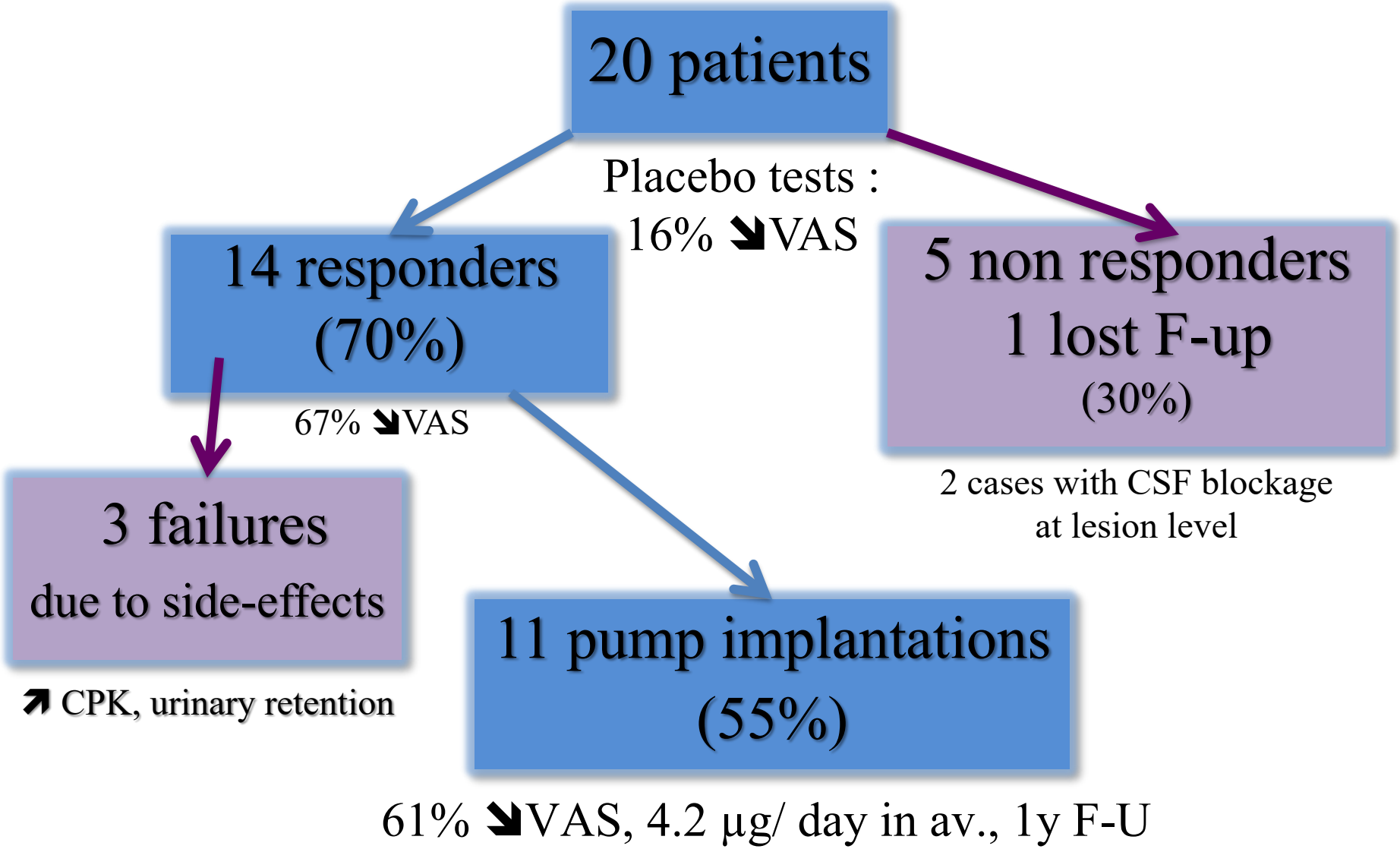
- **Polyanalgesic Consenssus Committee 2017**: starting at 0.5–1.2 µg/day, followed by 0.5–1 µg/day every several days continuous mode

- **Lindley Neuromodulation 2021 (spinal pain):** start with basal rate at a lowest programmable dose and utilizing High-Volume, Low-Concentration bolus for the majority of the medication delivery

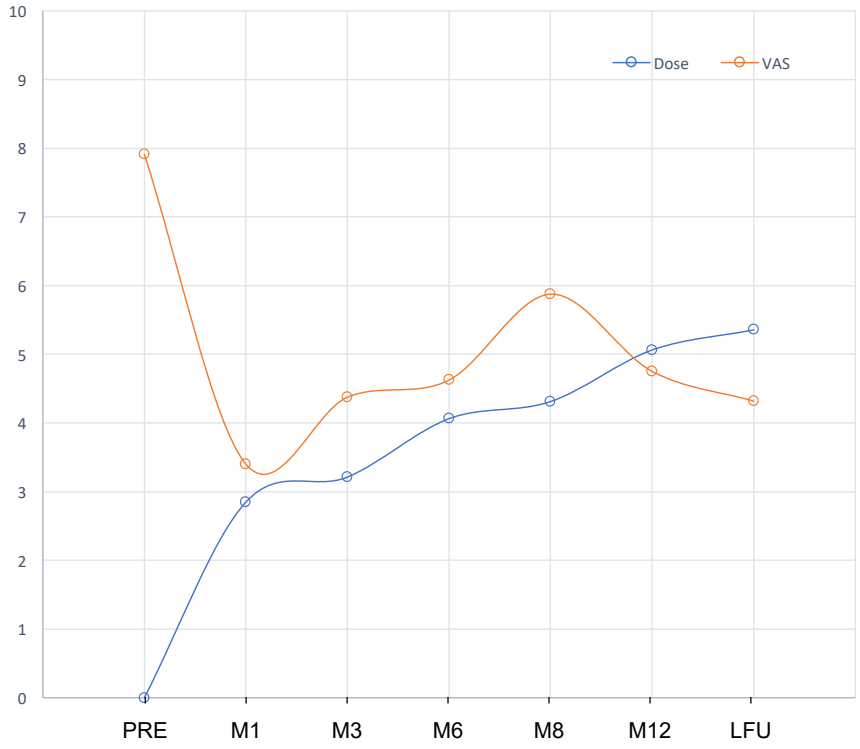
40cc Pump at 0.024-µg/day basal rate + 0.25-µg on-demand patient-administered bolus 3/ day max

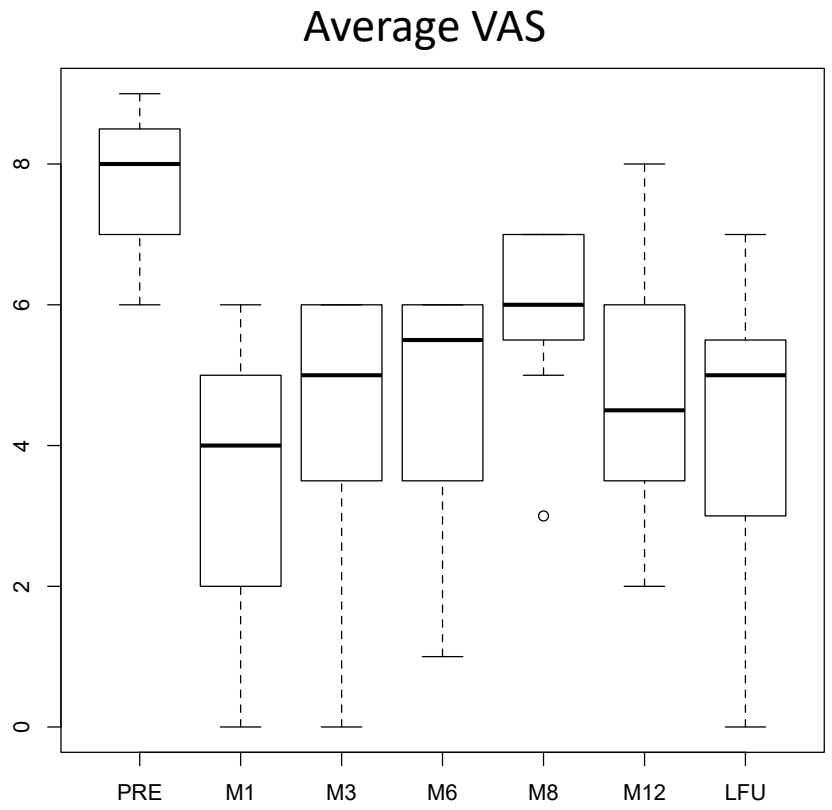
Average total dose : 0.736 µg/day (range, 0.024–2.379 µg)

Results


20 patients
Placebo tests :
16% ↘VAS
14 responders
(70%)
67% ↘VAS
5 non responders
1 lost F-up
(30%)
2 cases with CSF blockage
at lesion level
3 failures
due to side-effects
↗ CPK, urinary retention
11 pump implantations
(55%)
61% ↘VAS, 4.2 µg/ day in av., 1y F-U

Results





- Dose
- VAS

Follow-up

Recommandations IT

Interventional management of neuropathic pain: NeuPSIG recommendations

Indication/intervention	Quality of evidence	Strength of recommendation	Additional comments
Herpes zoster			
Epidural or paravertebral nerve block(s) for treatment of pain	Moderate	Weak	Provides relief of acute pain, but has not been compared against less invasive treatments, such as oral pharmacotherapy
PHN (truncal)			
SCS	Low	Inconclusive	Weak evidence, but positive case series results in refractory PHN
IMD	Low	Inconclusive	Somewhat promising results in other types of chronic pain
Intrathecal steroid and local anesthetic injections	Low	Inconclusive	Unreplicated positive RCT, but concerns about the RCT and about safety (see text)
PRF treatment	Low	Inconclusive	Single RCT showing efficacy until 6 months
Sympathetic nerve blocks	Moderate	Against	Non-randomized studies have not shown benefit
Painful DPN and other peripheral neuropathies			
SCS	Low	Inconclusive	Weak evidence with small, positive case series with large effects in refractory DPN over long-term follow-up
IMD	Low	Inconclusive	Somewhat promising results in other types of chronic pain
DBS	Low	Inconclusive	Weak evidence but promising results in small, uncontrolled series
Surgical decompression	Low	Inconclusive	Most likely to be beneficial in patients with evidence of peripheral nerve compression
Peripheral nerve injury and brachial plexus avulsion			
Neuroma resection and relocation	Low	Inconclusive	Weak evidence in peripheral nerve injury
DREZ lesion	Low	Inconclusive	Weak evidence in brachial plexus avulsion
Spinal cord injury neuropathic pain			
SCS	Low	Inconclusive	Weak evidence, but positive case series results in refractory spinal cord injury NP
IMD	Low	Inconclusive	Very weak evidence in refractory spinal cord injury NP, but somewhat promising results in other types of chronic pain
DREZ lesion	Low	Inconclusive	Weak evidence in refractory spinal cord injury NP
DBS	Low	Inconclusive	Weak evidence in refractory spinal cord injury NP with lower published rates of success than DREZ lesioning, concerns about potential for adverse effects
Central post-stroke pain			
SCS	Low	Inconclusive	Very weak evidence, poor response rate in a single case series
MCS	Low	Inconclusive	Weak evidence, but a number of case series have demonstrated ~50% response among refractory patients
DBS	Low	Inconclusive	Weak evidence in refractory patients with central post-stroke pain
Radiculopathy			
Epidural steroid injection(s)	Moderate	Weak	Short-term benefit for patients with prolapsed lumbar disc
PRF therapy for cervical or lumbar radiculopathy	Low	Inconclusive	Weak evidence of short-term benefit
RF lesioning for cervical radiculopathy	Low	Inconclusive	Weak evidence of short-term benefit
RF lesioning for lumbar radiculopathy	Moderate	Against	High-quality RCT failed to show benefit over sham radiofrequency lesioning
Adhesiolysis	Low	Inconclusive	Single RCT showed efficacy of adhesiolysis, but the study design limits confidence in conclusions of this study
FBSS with radiculopathy			
SCS	Moderate	Weak	Based on two RCTs appears to be better than reoperation and conventional medical management, but response rate relatively low and complication rate relatively high
Epidural steroid injection(s)	Low	Inconclusive	Weak evidence, but the authors consider a treatment trial prior to SCS a reasonable option for medically refractory patients given the evidence in radiculopathy, low risk, low cost, and higher complication risk with SCS
Adhesiolysis	Low	Inconclusive	Three RCTs have demonstrated pain score improvement with adhesiolysis, but the possible effects on the neuropathic (radicular) component of the pain are not described
IMD	Low	Inconclusive	Weak evidence in FBSS with radicular symptoms
DBS	Low	Inconclusive	Weak evidence, with few patients in case series with promising results
CRPS			
SCS for CRPS 1	Moderate	Weak	Long-term benefit demonstrated in CRPS type 1 patients, reoperation rate for complications 42% at 5 years, but 95% would undergo implantation again for the same result
SCS for CRPS 2	Low	Inconclusive	Very limited evidence
Sympathetic nerve block	Low	Inconclusive	Very limited evidence, but low risk; may be more beneficial early in disease
IMD	Low	Inconclusive	Little evidence for the treatment of CRPS except some evidence suggesting benefit of baclofen for treatment of dystonia associated with CRPS
Repeated ketamine infusions	Low	Inconclusive	Evidence of benefit in small RCTs, but administration protocol and long-term benefits and especially risks remain unclear
Trigeminal neuralgia			
MVD, radiofrequency rhizotomy, glycerol rhizotomy, balloon compression or stereotactic radiosurgery	Low	Inconclusive	There is a lot of low-quality evidence suggesting significant benefit from these procedures in patients refractory to medical treatment. MVD is the most invasive but may offer the longest benefits.

PAIN

Dworkin, Robert H.; O'Connor, Alec B.; Kent, Joel; Mackey, Sean C.; Raja, Srinivasa N.; Stacey, Brett R.; Levy, Robert M.; Backonja, Miroslav; Baron, Ralf; Harke, Henning; Loeser, John D.; Treede, Rolf-Detlef; Turk, Dennis C.; Wells, Christopher D. PAIN154(11):2249-2261, November 2013

Summary of quality of evidence and strength of recommendations for interventions for different types of neuropathic pain.

Intrathecal medication delivery
Quality of evidence : Low
Strength of recommandation : Inconclusive

Received: March 4, 2016 Revised: May 23, 2016 Accepted: May 23, 2016

(onlinelibrary.wiley.com) DOI: 10.1111/ner.12538

The Polyanalgesic Consensus Conference (PACC): Recommendations on Intrathecal Drug Infusion Systems Best Practices and Guidelines

Neuromodulation. 2017;15:436–466

Consensus Committee recommendations for intrathecal medication in neuropathic pain management

Statement	Evidence level	Recommendation grade	Consensus level
Intrathecal therapy should be utilized for active cancer-related pain with opioids.	I	A	Strong
Intrathecal therapy should be utilized for active cancer-related pain with ziconotide.	I	A	Strong
Intrathecal therapy should be utilized for noncancer-related pain with opioids.	III	B	Strong
Intrathecal therapy should be utilized for noncancer-related pain with ziconotide.	I	A	Strong

Available online at ScienceDirect www.sciencedirect.com
Elsevier Masson France EM|consulte www.em-consulte.com
Revue neurologique
ELSEVIER

Méthode d'évaluation GRADE – Etudes 2013-2019

Practice guidelines

Pharmacological and non-pharmacological treatments for neuropathic pain: Systematic review and French recommendations

X. Moisset [a,b,*], D. Bouhassira [c,d], J. Avez Couturier [e], H. Alchaar [f], S. Conradi [g], M.H. Delmotte [h], M. Lanteri-Minet [a,i], J.P. Lefaucheur [j,k], G. Mick [l], V. Piano [m], G. Pickering [a,n], E. Piquet [l], C. Regis [o], E. Salvat [p], N. Attal [c]

suppl. informations

Neuropathic pain

- Focal peripheral NP
- Other peripheral or central NP

1st line

- Lidocaine plasters *(1-3 plasters, 12h/d)*
  TENS *(≥ 30 minutes/d)*
- or
- SNRIs (Duloxetine *(60-120mg/d)* or Venlafaxine *(150-225mg/d)*)
  Gabapentin *(1200-3600mg/d)*
  Tricyclic antidepressants *(10-150mg/d)*

2nd line

- Capsaicin 8% patch *(1-4 patches/ 3 months)*
  Botulinum toxin A *(50-300 units/ 3 months)*
- or
- Pregabalin *(150-600mg/d)*
  Tramadol *(100-400mg/d)*
  Combination therapy *(antidepressants + gabapentinoids)*

3rd line

- HF-rTMS of M1 *(>5Hz, >1200pulses/session)*
- Spinal cord stimulation *(FBSS and diabetic neuropathic pain)*
- Strong opioids alone or in combination *(in absence of alternative, <150MME/day, after risk of abuse evaluation)*

????

Psychotherapy

Recommandations 2020
Thérapies IT

Les preuves ne sont pas concluantes en ce qui concerne le niveau de recommandation de la thérapie intrathécale avec la méthylprednisolone pour la douleur neuropathique. Nous n'avons pas trouvé de données pour le ziconotide, la morphine et la clonidine dans la douleur neuropathique, car aucune étude en double aveugle évaluant spécifiquement la douleur neuropathique n'a été publiée. Cela n'exclut pas l'efficacité potentielle de la morphine et du ziconotide en IT, car ces médicaments se sont révélés bénéfiques dans des essais en double aveugle chez des patients souffrant de douleurs chroniques réfractaires, y compris des patients souffrant de douleurs neuropathiques.

2. Techniques invasives à disposition

1. **« Anatomiques »** = Réparation anatomique

2. **Neuromodulation**

3. **Lésions hypersélectives**

dirigées vers des cibles reconnues comme participantes aux mécanismes algogènes

Chirurgie dans la zone d'entrée de la racine dorsale

(dorsal root entry zone = DREZ)

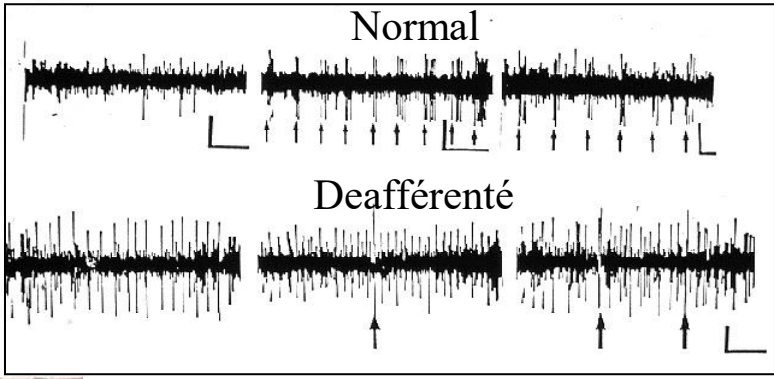
M. Sindou, 1974

DREZotomie

aux niveaux rachidiens correspondants afin de :

1-Réduire sélectivement les entrées nociceptives des fibres C, en épargnant les fibres inhibitrices cordonnales postérieures

2-Détruire les neurones hyperactifs de la corne dorsale désafférentée :

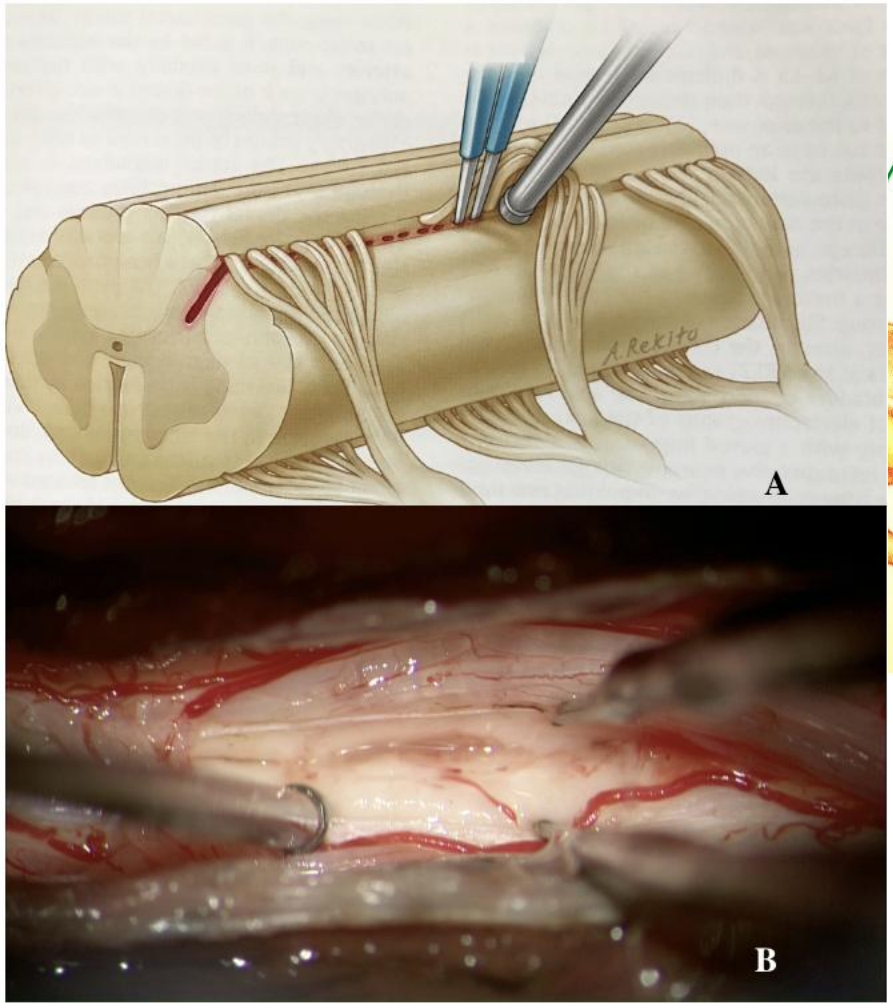


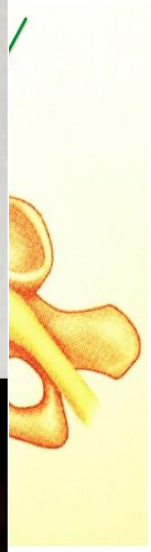
Effets attendus de la Drezotomie dans le territoire opéré

- **Anesthésie thermo-algique** homolatérale
- **Diminution du tonus musculaire**

Devant être acceptables !

Drezotomy
Surgical technique





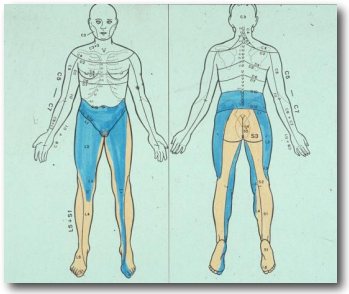
Drezotomie-Indications

- **Douleurs de niveau lésionnel dans atteintes médullaires**

Sampson et al. J Neurosurg 1995

Sindou, et al. Pain, 2001

Douleurs de niveau lésionnel



- **Douleurs du cancer de topo. limitée**

(ex : Pancoast-Tobias)

- **Avulsion plexuelle**

Naschold et al. J Neurosurg 1979

Campbell et al. Appl neurophysio 1988

Young et al. Neurosurgery 1990

Samii et al. Neurosurgery 2001

Aichaoui et al., Pain, 2011

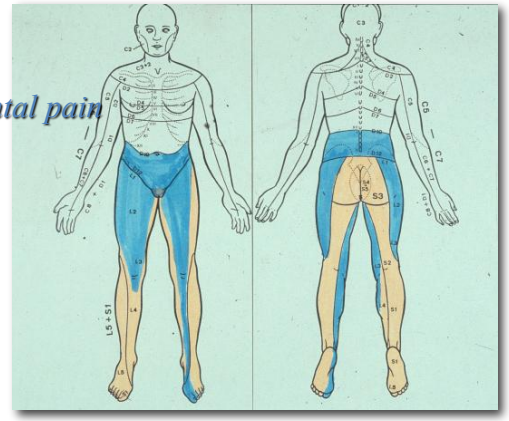
- **Allodynies – Douleurs paroxystiques** associées avec lésions nerveuses périphériques

Friedman AH et al. Appl Neurophysio, 1988

Coffey RJ Neurosurgical surgery 1996

Drez lesion

for Pain due to spinal injury



Results on pain (44 patients - 6 years on av.)

Level of lesion (Nb of patients)	Pain	Good result > 75%	Fair result 75% > - >25%	Poor result < 25%
Conus medullaris (25)	Segmental (= at level of the injury)	82%	6%	12%
Cauda equina (4)	Segmental	33%	33%	33%
Thoracic cord (8)	Segmental	40%	40%	20%
Thoracic cord (4)	Below lesion	0%	50%	50%
Cervical cord (3)	Below lesion	0%	66%	33%
Overall results 1) total segmental (37)	Segmental	68%	10 %	22 %
2) total below lesion (7)	Below lesion	0%		

Sindou, Mertens et al. Pain, 2001

Contents lists available at ScienceDirect

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro

Review Article

Long term results of Dorsal Root Entry Zone (DREZ) lesions for the treatment of intractable pain: A systematic review of the literature on 1242 cases

Lorenzo Mongardi [a,1,*], Jacopo Visani [a,1], Giorgio Mantovani [a], Costanza Vitali [b], Luca Ricciardi [c], Flavio Giordano [d], Michele Alessandro Cavallo [a,e], Giorgio Lofrese [f],

Clinical outcome for each indication,.

Surgical indication	No. papers	No. patients evaluated	Good Outcome	Fair Outcome	Poor Outcome	Dead/lost during the follow up
Cancer Pain/post radiation	13	130 (10.19%)	98 (75.4%)	4 (3.1%)	24 (18.4%)	4 (3.1%)
Brachial plexus avulsion	25	717 (56,23%)	436 (60,80%)	150 (20,92%)	118 (16,45%)	13 (1,83%)
Spinal cord injury	15	301 (23,61%)	168 (55.8%)	35 (11.6%)	82 (27.3%)	16 (5.3%)
Phantom limb pain	8	49 (3,85%)	22 (44.9%)	14 (28.6%)	13 (26.5%)	–
Post herpetic neuralgia	9	78 (6.12%)	40 (51.2%)	14 (18%)	24 (30.8%)	–
Total	46	1275	764	217	261	33

Drezotomie – Complications

- Troubles neurologiques dans le membre inférieur ipsilatéral :

Lésion du cordon dorsal
➔Ataxie 5% dont ½ temporaire

Lésion du Fx cortico-spinal
➔Parésie 1,6%

- Liés à l'abord rachidien :

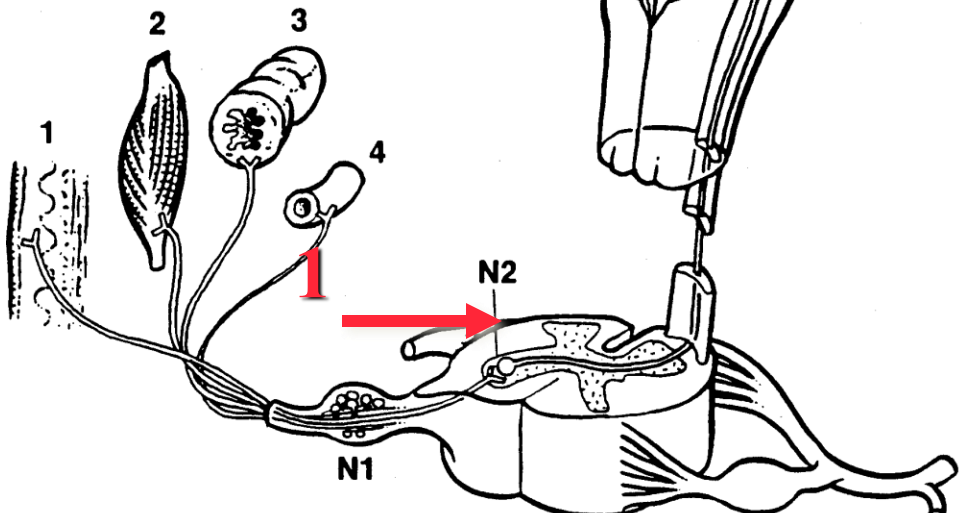
- Pseudoméningocèles et fuites de LCR 1,4%
- Infections 2,6%

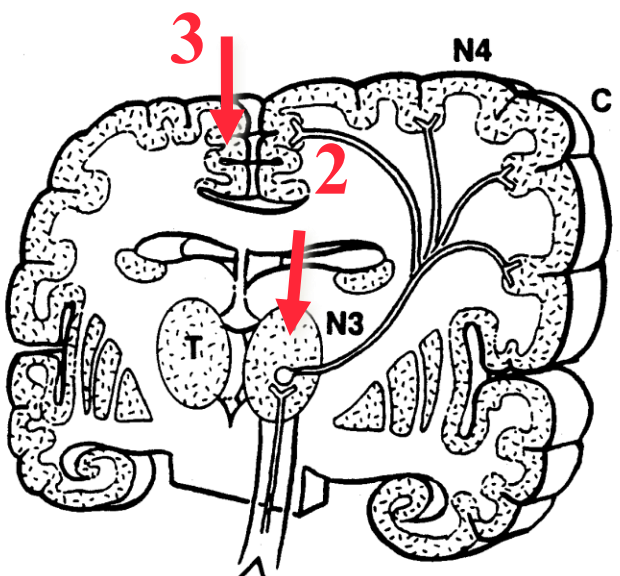
Sindou, Blondet, Emery, Mertens JNS, 2005

3- Lésions sélectives

Dirigées vers des cibles ayant démontré leurs rôles dans les mécanismes des **douleurs neuropathiques**
Composante affectivo-émotionnelle

1 Drezotomy
2 Median
Thalamotomy
3. Cingulotomy





Thalamotomie

Cible un relais de la composante motivationnelle-affective du réseau de la douleur

Essaye de corriger la dysrythmie thalamo-corticale dans la douleur chronique

Lésions non invasives par des techniques transcrâniennes actuellement en cours de développement ciblent le noyau central latéral :

- GK : *Gamma knife* thalamotomy

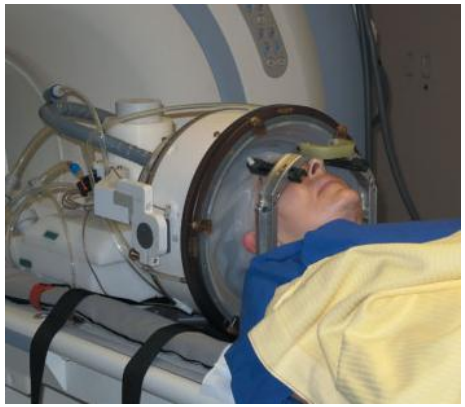
  Ohye C et al. Prog Neurol Surg. 2009; 22:170-81

- HIFU : *High-Intensity Focused Ultrasound*

  Jeanmonod D et al.Thalamus Relat Syst, 2011

Patients with peripheral > central neuropain experienced pain relief > 50%

- 49% at 3 months follow-up
- 57% at 1year follow-up



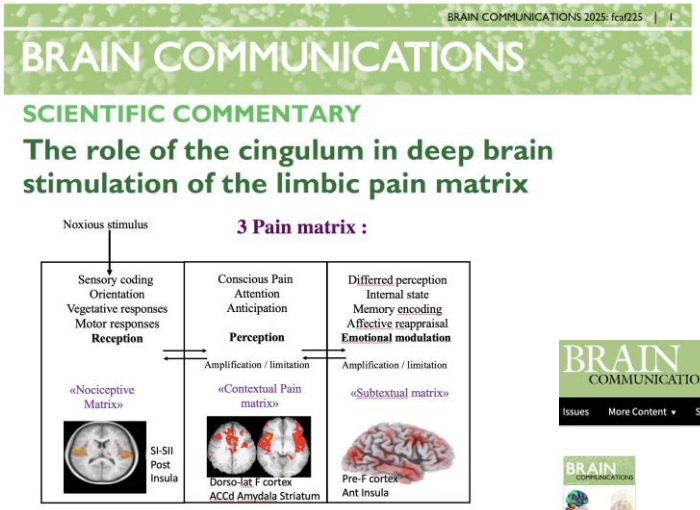
Best of Pain Neurosurgery 2023-2025

Ablative techniques

- **Cingulotomy**

Publications in Pub Med

A limited number of eight distinct studies have documented the outcomes associated with stereotactic cingulotomy for the management of cancer-related pain and some cases of non-cancer pain
Risk of neurocognitive impairment ?
More DBS for neuropathic pain ?



Prise en charge des douleurs neuropathiques chez le patient neuro-handicapé

1. Techniques invasives
2. Particularités du patient neuro-handicapé
3. Principes des indications

3- Principes des indications

- A adapter à chaque patient
- Pas de technique « unique » pour tous
- « *Primum non nocere* »

➔ Thérapeutique personnalisée

3- Principes des indications
Places de l'IT – Techniques lésionnelle

Douleurs neuropathiques périphériques (radiculaires) :

Suivant localisation – territoires +++

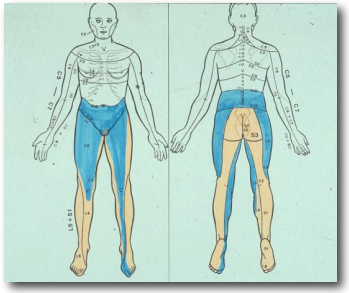
1. Décompression (si nécessaire…)
2. Neurostimulation (Médullaire)
3. Infusion intrathécale de Prialt
4. Drezotomie si allodynies réfractaires

3- Principes des indications
Places de l'IT – Techniques lésionnelle

Douleurs neuropathiques centrales médullaires:

Suivant :

- Caractère complet – incomplet lésions sensitives
- Niveau des douleurs (lésionnelles – sous lésionnelles)

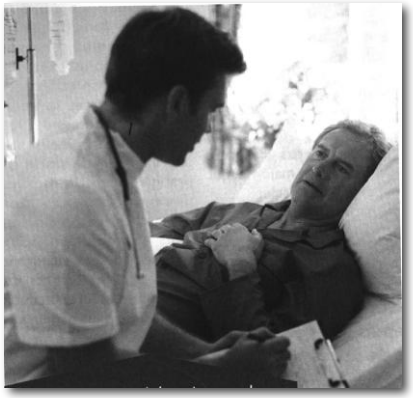


1. Décompression – libération (si possible…)
2. Stimulation médullaire si incomplet (PES +)
3. Infusion de Prialt pour douleurs lésionnelles et sous lésionnelles
4. Drezotomie pour douleurs de niveau lésionnel

(Stimulation corticale / cérébrale profonde en évaluation)

Place des techniques d'analgésie intrathécale et des techniques lésionnelles

Conclusion



- Les patients handicapés devraient pouvoir accéder à ces techniques interventionnelles dans le cadre d'un contrat thérapeutique avec des objectifs clairs, raisonnables et partagés

- 1er ligne Technique de neuromodulation : 1- Neurostim 2- IT
- 2em ligne Techniques lésionnelles indications limitées : Drezotomie (autres ?)

Réservé à des patients rigoureusement sélectionnés par une équipe multidisciplinaire

A quel moment orienter vers les thérapies invasives ?

(Timing)

- Après une prise en charge médicale bien conduite

- Mais ne pas trop attendre ! Dangers :
  - Excès « morphinisation »
  - Accumulation des neurotropes

Débat actuel : Certaines techniques invasives de par leurs efficacités et / ou leurs relatives faibles morbidités mériteraient d'être discutées plus en amont ?