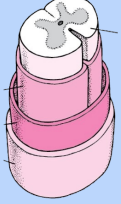

Assessing Repair Techniques for Incidental Durotomy: A Ten-Year Review at a Tertiary Centre

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Objectives

- Analyse prevalence of incidental durotomies in lumbar spine surgeries
- Evaluate efficacy of Dural repair techniques
- Identify best practice and recommendations for repair of incidental durotomies.

Introduction

An incidental durotomy (ID) is the inadvertent tear in the spinal dural mater during surgery, incidences ranges from 1% to 17% (1). Inadequate closure of such dural tear can cause CSF leakage leading to a sequalae of headaches, nausea and vomiting, neuropathy, pseudomeningocele and arachnoiditis, (2). No national guidelines exist for ID management and is often on the expertise of the operating surgeon. The following management techniques can be used as monotherapy or in combination with one another (table 1):

Type	Technique
Sealant	Duraseal, Tisseal
Primary closure	LeMaitre clips (AnastoClips GC®), Liga clips, Suturing
Patch/Graft	Fat graft, Muscle patch, Duragen

Table 1. ID repair techniques

LeMaitre clips are a newer technique clips placed in an interrupted manner to facilitate dural closure, thus eliminating CSF leakage occurring from suture holes (3). Previous literature on this topic by Choi et al 2021 has shown that the combination of primary closure (suturing/clips) and graft/patch has the lowest CSF leakage rate of 5.5% post ID repair (4)

Figure 1. Duragen

Figure 2. Duraseal

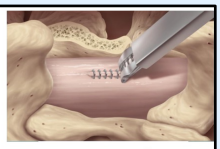

Figure 3. LeMaitre Clips

Methods

- Retrospective data collection and analysis of ID, in adult patients having lumbar spine surgery at University Hospital Wales and University Hospital Llandough, over 10 years from January 2013 to January 2023. BlueSpier was used to identify patients that had a lumbar procedure resulting in an ID. Data was collected on primary or revision surgery, type of procedure management technique of repair, lumbar wound drain and days of bed rest.
- Welsh Clinical Portal helped collect data on post-operative complications. Spinal directorate audit to determine the total number of various lumbar procedures carried out over the 10 years.
- SPSS software was used for descriptive statistics and cross-tabulation tables.

Results

139 ID patients were collected, mean age of patients being 59± 15.4 years. Primary repair procedures had a 18% complication rate versus revision repairs with 32% after ID repair.

All surgeries	Total	Number of ID	Incidence
Primary Lumbar decompression	1094	49	5%
Revision lumbar decompression	36	19	**52%**
Primary lumbar discectomy	287	6	2%
Revision lumbar discectomy	31	4	**13%**
Primary Discectomy+decompression	176	17	9.6%
Revision discectomy+decompression	32	4	**12.5%**
ALIF	86	1	1%
TLIF/PLIF	227	15	6.6%
Lumbar decompression and fusion	134	24	10%

Table 2: Incidence of ID in lumbar procedures

Sealant + patch graft had the highest failure rate at 29%. Primary closure+ sealant was the most effective.

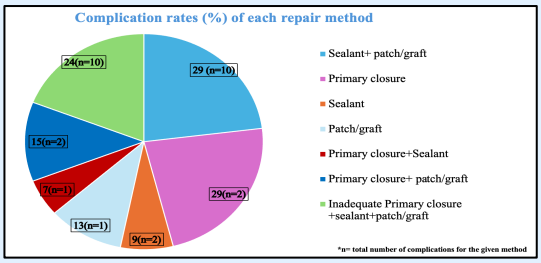

Figure 4. repair method complication rate (%)

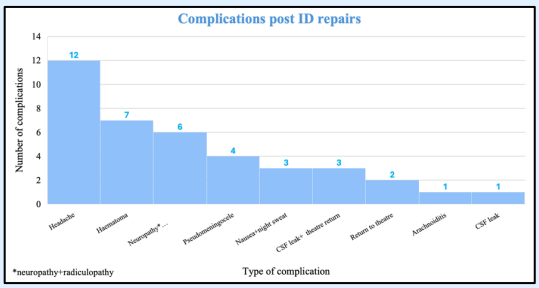

Figure 5. prevalence of the types of complications

70-79yrs was responsible for the highest proportion of ID from any age group (n=40), however this cohort had fewer complications.

Conclusion

- The overall ID incidence rate in this study was 6.6% (139/2103).
- Revision procedures have highest ID rates due to adhesions from previous surgeries and lack of natural barriers such as bone, ligament and fat. Sealant/patch/graft and Inadequate Primary closure and Sealant + patch/graft had the highest complication rate.
- I conclude that the best practice for repair of ID is primary closure with sealant.

References: 1. Ishikura H, Ogihara S, Oka H, Maruyama T, Inanami H, Miyoshi K, et al. Risk factors for incidental durotomy during posterior open spine surgery for degenerative diseases in adults: A multicenter observational study [Internet]. U.S. National Library of Medicine; 2017 [cited 2024 May 6]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5708748/
2. Grewal IS, Grewal US, Eadsforth T, Pillay R. Incidental spinal durotomies noted during spinal surgery: Incidence and management [Internet]. Scientific Archives; 1970 [cited 2024 May 6]. Available from: https://www.scientificarchives.com/article/incidental-spinal-durotomies-noted-during-spinal-surgery-incidence-and-management
3. Anastoclip GC® closure system [Internet]. [cited 2024 May 8]. Available from: https://www.lemaitre.com/products/anastoclip-gc-closure-system
4. Choi EH, Chan AY, Brown NJ, Lien BV, Sahyouni R, Chan AK, et al. Effectiveness of repair techniques for Spinal Dural Tears: A systematic review. World Neurosurgery. 2021 May;149:140–7. doi:10.1016/j.wneu.2021.02.079

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“Tears and Repairs” Incidence and Outcomes of Incidental Durotomy over 10 Years in a Tertiary Centre

Diya Desai, Iqroop Chopra and Michael McCarthy

Background

An incidental durotomy (ID) is an inadvertent tearing of the spinal dural mater during surgery, its incidence ranges from 1% to 17%. They are identified intraoperatively via the vagal manoeuvre and immediately closed intraoperatively, Inadequate closure of the tear can cause CSF leakage leading to a sequalae of headaches, nausea and vomiting, neuropathy, arachnoiditis and pseudomeningocele. No national guidelines exist for management of ID and is often on the expertise of the operating surgeon. The following management techniques can be to fix an ID, either as monotherapy or in combination with one another: Sealants such as Duraseal and Tisseal; Primary closure method like LeMaitre clips (AnastoClips®), Suturing and Liga clips. Patches or grafts such as Duragen, fat graft and muscle patch. LeMaitre clips are a newer technique which uses clips placed in an interrupted manner to facilitate dural closure, thus eliminating CSF leakage occurring from suture holes. Previous literature on this topic by Choi et al 2021 has shown that the combination of primary closure (suturing/clips) and graft/patch has the lowest CSF leakage rate of 5.5% post ID repair.

Method

Retrospective data collection and analysis of ID, in adult patients having lumbar spine surgery at University Hospital Wales and University Hospital Llandough, over 10 years from January 2013 to January 2023. BlueSpier was used to identify patients that had a lumbar procedure resulting in an ID. Data was collected primary or revision surgery, type of procedure management technique of repair, lumbar wound drain and days of bed rest. Welsh Clinical Portal helped collect data on post-operative complications. Spinal directorate audit to determine the total number of various lumbar procedures carried out over the 10 years. SPSS was used for descriptive statistics and to create cross-tabulation tables when analysing the data.

Results

139 ID patients were collected through data search, the mean age of patients was 59± 15.4 years. Revision surgeries (n=31) had a higher incidence and complication rate when compared to primary surgeries (n=108) across all types of lumbar procedures. With secondary lumbar decompression having a 52% incidence rate of ID, both secondary lumbar discectomy and secondary discectomy+decompression have a 13% incidence. The complication rate was the number of complications patients experienced after the ID was fixed intra-operatively. Primary repair procedures had a 18% complication rate versus secondary repairs with 32%.

When evaluating the efficacy of the dural repair techniques, primary sealant + patch graft(n=34) had the highest complication rate at 29%.Primary closure+ sealant (n=14) had the lowest complication rate at 7%. 29 patients had complications post ID repair, some patients experienced a combination of different complications. Headaches were the most common complication (n=12) followed by haematoma (n=7). 3 patients had a CSF leak which required return to theatre and 4 patients developed a pseudomeningocele. Gender differences did not play a role in increased likelihood of developing complications. However, 70-79yrs patients were responsible for the highest proportion of ID (n=40). Conversely, 20–29-year age group had the highest complication rate post ID repair.

Conclusions

The overall ID incidence rate in this study was 6.6% (139/2103). Revision procedures have highest ID rates due to adhesions from previous surgeries and lack of natural barriers such as bone, ligament and fat. Sealant/patch/graft and Inadequate Primary closure and Sealant + patch/graft had the highest complication rate. I conclude that the best practice for repair of ID is primary closure with sealant.