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Supplemental material

Surgical management of complex spinal cord lipomas: how, why, and when to operate. A review
JNSPG 75th Anniversary Invited Review Article

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DISCLAIMER The Journal of Neurosurgery acknowledges that the following section is published verbatim as submitted by the authors and did not go through either the Journal’s peer-review or editing process.
Supplemental Figure 1

Dorsal lipoma. A. Intraoperative picture shows neat oval fusion line around lipoma-cord interface on a horizontal plane. Note intact conus and caudal sacral roots.

B. Resection of dorsal lipoma can be executed with a completely circumscribed perspective from all sides of the fusion line, impossible with transitional lipoma.

Supplemental Figure 1A:
Supplemental Figure 1B:
Supplemental Figure 2

Transitional lipoma. A. Intraoperative picture showing massive lipoma but very distinct dorso-ventral fusion line separating fat from the DREZ and dorsal roots, which always lie lateral and ventral to the fusion line. The ventral side of the placode is always free of fat in a regular transitional lipoma.

B. Top: Idealised drawings of pre- and post-resection of a relatively “standard” transitional lipoma, along an asymmetrical and oblique plane bound by the fusion line on each side, over an occasionally undulating lipoma-cord interface. Bottom shows pre- and post-resection intraoperative pictures.

Supplemental Figure 2B:
Supplemental Figure 3

Chaotic lipoma.

A. Left: Sagittal MRI shows ventral as well as dorsal fat in relation to the neural placode. Note sacral agenesis with only 2 visible sacral segments. Right: Axial image shows ventral fat and extremely irregular lipoma-fat interface.

B. Intraoperative picture showing fat ventral to placode and on one of the sacral roots (arrowhead). Note absence of discrete fusion line.

Supplemental Figure 3A:
Supplemental Figure 3B:
Supplemental Figure 5

Mesenchymal derivatives in a dorsal lipoma, including muscle, collagen, cartilage, and bone. Doral root ganglion is from entrapped neural crest cells.

Supplemental Figure 6

Embryogenesis of chaotic lipomas. Left: Basic error probably occurs with accelerated differentiation of lipogenic mesenchymal cells within the caudal cord during condensation stage (Stage 1) of secondary neurulation and formation of the medullary cord, thereby incorporating fat tissue in the substance of the mature neural placode. Middle and right show dorsal and ventral fat and associated sacral agenesis. 1° NT = primary neural tube; 2° NT = secondary neural tube; NC = notochord. (Reprinted from: Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)

Supplemental Figure 6:
Supplemental Figure 7

Concentric coaxial bipolar microprobe stimulator, in which the concentric cathode and anode are separated by a coaxial insulator. Tip diameter is approximately 1.75 mm. The microprobe delivers very focal current spread (Inset). (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 8

MRI of a 12 month old girl with left leg weakness shows a large dorsal lipoma. The sagittal image shows a long stretch of lipoma-cord interface, but the conus is clearly free of fat. The axial images reveal the irregular nature of the lipoma-cord interface, but the neural placode is not excessively tilted to one side. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 8:

**Dorsal Lipoma: 1 Year Old, Slightly Weaker Left Leg**
Supplemental Figure 9

The lateral radiograph showing the localising markers is matched to the sagittal MRI to finalise the top and bottom extent of the exposure. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND)

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Supplemental Figure 10

Large extradural portion of the lipoma before dural opening. Note huge dural defect through which the extradural lipoma extends. Rostral exposure is to the right. Note the essential wide bony exposure. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 11

Left crotch dissection in the large dorsal lipoma shown in Fig. 10. The lipoma is grasped firmly and pulled gently away from the adherent points on the inner dura, stretching the adhesion bands and thick arachnoid, creating the “crotch” and making the adhesions safe to be cut. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 11:

**Left “Crotch Dissection”**
Supplemental Figure 12

Right crotch dissection.

A. Cutting of the “crotch” on the right side as in Figure 14.

B. Lysing the crotch exposes the hidden nerve roots, the ventral neural placode, and the ventral free subarachnoid space.

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Supplemental Figure 12A:

Right “Crotch Dissection”
Supplemental Figure 12B:

Right “Crotch Dissection” — Marching Caudally
Supplemental Figure 13

Marching caudally with the right crotch dissection, the surgeon exposes the ventral surface of the placode, the free ventral subarachnoid space, and more nerve roots that can be traced all the way to their exit foramina. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND

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Supplemental Figure 13

Right “Crotch Dissection” — Marching Caudally
Supplemental Figure 14

After crotch dissection on the right side and complete detachment of the lipoma (hammock) from the right inner dural lining, the fat-free ventral subarachnoid space, caudal nerve roots, and conus are well seen. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 15

Complete crotch dissection on the left side, showing left nerve roots and ventral placode surface. Anatomy here is not as distinct and normal as on the right.

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Supplemental Figure 15:

Left “Crotch Dissection” Completed
Supplemental Figure 16

The lateral overhang of the lipoma is well appreciated. Only the “knees” of the dorsal roots are seen. The “thighs”, or the most proximal portions of the roots, are hidden by and adherent to the overhanging fat. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 16:
Supplemental Figure 17

“Knee dissection”: the adhesions covering the “thigh” of the dorsal roots are sharply taken down. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 18

After ridding the adhesions, the proximal “thigh” portions of the dorsal roots are exposed. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 19

The “true” fusion line on the right is revealed. Resection of lipoma on the lateral margin of the placode is now made safe. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 19:
Supplemental Figure 20

The fusion line on the left is not as distinct as the right side and not on an even level. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 20:
Supplemental Figure 21

Preparing for lipoma resection commencing on the rostral end of the fat where the lipoma-cord junction, the rostral dorsal roots, and beginning of the fusion lines are most distinct. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 22

Finding the white plane:

A. Beginning resection at the rostral extremity of the lipoma

B. Boldly cutting sharply into the gritty fibrofatty base of the fat lump to locate the thin white plane.

C. White plane located, which is a discrete though thin layer of whitish fibrous netting separating fat from spinal cord.

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Supplemental Figure 22A:
Supplemental Figure 22C:
Supplemental Figure 23

Resection of lipoma along the right fusion line.

A. Cutting sharply on the white plane near the right fusion line.

B. Note the pial fringe, carefully preserved for neurulation. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 23A:
Supplemental Figure 23B:
Supplemental Figure 24

Resection of lipoma along the left fusion line.

A. Cutting lipoma from fusion line.

B. Note white plane and left pial fringe.

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Supplemental Figure 24A:
Supplemental Figure 24B:
Supplemental Figure 25

The white plane, with the unresected portion of the lipoma on the left lifted up to show the resection front as a well defined transverse line across the body of the neural placode. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 26

Micro-irrigating bipolar cautery with super-fine tips measuring less than 0.2 mm.

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Supplemental Figure 27

Lateral white plane dissection along the right fusion line is almost complete.

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Supplemental Figure 27:
Supplemental Figure 28

Resection of the most caudal portion of the lipoma in the caudal to rostral direction, possible because this is a dorsal lipoma. The caudal white plane thus created will eventually merge with the proximal white plane resulting from the previous rostral-to-caudal dissection.

A. Beginning white plane dissection from the conus side.

B. More caudal white plane exposed.

C. Last cut before completing white plane dissection.

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Supplemental Figure 28A:
Supplemental Figure 28B:
Supplemental Figure 29

Surgery for chaotic lipoma.

A. Note ventral pia-covered fat medial to ventral nerve roots (being stimulated by concentric microprobe stimulator), and dorsal fat perched on the dorsal side of the placode. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))


C. Caudal placode pulled up dorsally width-wise to be neurulated with the more proximal pial edge to form the seam, displaying the unviolated pia-covered ventral fat as a blunt stump. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

D. Pre- and postoperative MRI shows residual fat on the detached cord stump. The cord is untethered, the thecal sac is augmented, and the syrinx has collapsed. (Reprinted from Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS.)

Supplemental Figure 29A:
Supplemental Figure 29B:
Supplemental Figure 29C:
Supplemental Figure 29D:
Supplemental Figure 30

Continuing from supplemental figure 28, the “naked” neural placode after complete resection of the dorsal lipoma. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 31

Temporary small Weck Clips are applied to the apposed pial fringes to absorb the tissue torque tending to unfurl the dorsal bending of the placode. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND

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Supplemental Figure 31:
Supplemental Figure 32

On pulling the pial fringes together to check the ease of the dorsal neurulation, considerable lateral tugging is felt on the right, due to the “short” nerve roots.

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Supplemental Figure 32:
Supplemental Figure 33

Dealing with “short” nerve roots:

A. The impression of shortness is spurious; these functional and supple roots appear short because they were bound tightly to the inner lining of the dura by adhesion bands that are being cut.

B. More adhesion bands being cut.

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Supplemental Figure 33A:
Supplemental Figure 33B:
Supplemental Figure 34

After having been detached from the inner lining of the dura, these “short” nerve roots become magically “lengthened”. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 34:
Supplemental Figure 35

Pia-to-pia neurulation of the neural placode.

A. Pia-to-pia suturing with 8-0 nylon sutures with knots buried.
B. Tying of micro sutures, apposing the pial fringes from each side of the placode.
C. More 8-0 nylon suture.
D. Yet more sutures.
E. Burying the nylon knot.
F. Removing the last Weck clip.

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Supplemental Figure 35A:
Supplemental Figure 35C:
Supplemental Figure 35D:
Supplemental Figure 35E:
Supplemental Figure 35F:
Dorsal lipoma with bulky pyramid placode – lesson learned.

A. Note tall pyramid-shaped neural placode on axial profile, with steep side slopes interfacing with the lipoma.

B. Lipoma stalk and dorsal lipoma.

C. After lipoma resection, the placode is bulky in the middle and has thin pial fringes.

D. Only the loose caudal part of the placode was neurulated. Rostral bulky part is left open because of TcMEP deterioration on forced attempts to suture.

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Supplemental Figure 36A:

Significance of the Pyramid Placode
Supplemental Figure 36B:
Supplemental Figure 36C:
Supplemental Figure 36D:
Supplemental Figure 37

Back to the dorsal lipoma in supplemental figure 8, showing careful measurement of the length and width of the dural defect in preparation for fashioning the bovine pericardial graft. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 37:
After graft sutures are in place, water-tightness of the suture line is tested by several Valsalva manoeuvres. An optimal graft is one that does not leak, puffs up with expiration, and registers no inward folding, as this one. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 39

Pre- and post-operative MRI of a case of transitional lipoma with no residual fat after total lipoma resection. Note neurulated oblong-shaped fat-free neural placode within a large dural sac. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 39:

**Pre-Op**

**Post-Op**

[Image of MRI scans showing pre- and post-operative views with a neurulated placode highlighted.]
Supplemental Figure 40

Pre- and post-operative MRI of a case of complex transitional lipoma with a very small amount (<20 cu mm) of residual fat after resection. Axial image shows the small round piece of fat is wrapped up within the roundly neurulated neural placode and therefore not exposed on the surface. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 40:

![Pre-Op MRI](image1)

![Post-Op MRI](image2)

Fat wrapped up by Neurulation
Supplemental Figure 41

Cord-sac ratios in the post-operative axial MRI after total/near-total resection of lipoma. This ratio is obtained by dividing the sagittal diameter of the most bulbous portion of the post-neurulated neural placode by the sagittal diameter of the dural sac. 72% in our series have very loose sacs with cord-sac ratios < 30%; 23.2% have intermediate ratios 30-50%; and 4.8% have ratios > 50% with the least commodious cord-sac relationship. Cord-sac ratio estimates the degree of freedom of motion of the post-neurulated spinal cord within its container sac.

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Supplemental Figure 41:

- < 30% (72%)
- 30–50% (23.2%)
- > 50% (4.8%)
Supplemental Figure 42

Cox Multivariate analysis for the influence of cord-sac ratios on outcome in 117 redo lipomas that underwent total resection. Progression-free probabilities are indicated by arrows. A high PFS of 88.4% can still be managed even in redo lipomas if a cord-sac ratio <30% can be achieved, indicating the dominant role of cord-sac ratio, and conversely the subordinate role of other unidentified attributes of previous surgery, on long-term outcome (p value = 0.0214 between < 30% and > 50% cord-sac ratios). Pt = patients. (Reprinted from : Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)
Supplemental Figure 42:

(p = 0.0214 between < 30% and > 50% cord-sac ratio)
Supplemental Figure 43

Distribution of cord-sac ratios between the total resection and partial resection groups. Note 72% of patients who had total resection had cord-sac ratio < 30%, versus less than 3% of patients who had partial resection. Conversely, only 6% of patients who had total resection had high ratio of > 50%, versus over 90% of patients who had partial resection. The difference is significant (p = 0.00026). < 30%; 30-50%; and > 50% indicate the cord-sac ratios. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 43:

(p = 0.00026)
Supplemental Figure 44

Pre-operative profiling of good versus poor risk patients for total resection using three dimensional Multiple Correspondence Analysis plot, which displays the respective strength of influence of the 6 predictor variables (gender, age, lipoma type, symptoms, redo versus virgin lipomas, and cord-sac ratio) on outcome after total resection. The grey balls represent predictor variables and red balls represent outcomes. Only the statistically significant predictors are flagged. Bad outcome implies recurrence and good outcome the absence of recurrence during the follow-up period. Close clustering of variables (with flags) around an Outcome signifies strong influence; remote scattering of variables (without flags) from an Outcome signifies weak influence. Bad outcome is associated with pre-operative symptoms and redo lesions. (Reprinted from : Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)
Supplemental Figure 44:
Supplemental Figure 45

Same pre-operative profiling as in supplemental figure 44 for good outcome, using the same Multiple Correspondence Analysis plot. Good outcome is associated with children less than 2 years, asymptomatic lesions, and virgin lipomas. (Reprinted from: Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)
Supplemental Figure 46

Kaplan-Meier analysis for progression-free survival showing the predicted outcome of the 84 “ideal patients” who had had total resection; i.e., asymptomatic children younger than 2 years with virgin lipomas. The progression-free probability at 20 years is 99.2%, with disease stabilization after 5 years from surgery. (Reprinted from: Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)
Supplemental Figure 47

Non-surgical treatment of asymptomatic lipomas. The blue line denotes the Paris series of 53 patients followed prospectively for 9 years\textsuperscript{67}, with a PFS of 67%. The yellow line denotes the retrospective London series of 56 patients followed for 10 years\textsuperscript{69}, with a PFS of 60%. In the London series, females, those with transitional lipomas and conus syrinx did worse, thus with an even worse PFS (dotted yellow line). (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))

Supplemental Figure 47:
Supplemental Figure 48

The influence of lipoma type on outcome after total resection by KM analysis. The progression-free probabilities for the 3 lipoma types are indicated by arrows. There is no significant difference in outcome between dorsal and transitional lipomas (p=0.458 by Log-rank and 0.904 by Wilcoxon) even after adjusting for sample size. There are “tentative” differences between chaotic and the other lipoma types when compared individually (p= .0472 with dorsal lipomas and .0422 with transitional lipomas). Pt = patients. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND

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Supplemental Figure 48:
Supplemental Figure 49

The London non-surgical treatment progression-free survival curve\textsuperscript{69} is inserted on to the 3 PFS curves of the different lipoma types obtained with the Cox proportional hazards analysis. The hazard ratio between chaotic and transitional lipomas is not statistically significant but that may be due to the small number in the chaotic group. The 10 year PFS from the London series is very similar to the PFS of the chaotic lipomas, which raises the question whether there is merit in resecting asymptomatic chaotic lipomas. (Reprinted from Pang D. Total resection of complex spinal cord lipomas: how, why, and when to operate. Neuro Med Chir (Tokyo) 55: 695-721, 2015; with permission from the Japanese Neurosurgical Society. CC-BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/deed.ja))
Supplemental Figure 49:

Progression Free Survival Worse with Chaotic Lipomas

- Haz Ratio: Dor/Tran = 1.3291 (p = 0.6111)
- Chaotic/Tran = 3.4345 (p = 0.1007)

Not significant
Supplemental Figure 50

Paired Cox Univariate (upper) and Multivariate (lower) analyses of the influence of pre-operative symptoms on PFS. The respective progression-free probabilities for asymptomatic and symptomatic lipomas are indicated by arrows, and their hazard ratios and relevant p values are listed for each Cox analysis. This shows the individual influence (expressed in univariate analysis) of pre-operative symptoms on outcome disappears when the influences of the other predictor variables are jointly considered (by multivariate analysis). Pt = patients; Asym = asymptomatic lipomas; Sym = symptomatic lipomas. (Significant p values are in bold)  (Reprinted from : Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)
Supplemental Figure 50:

Univariate

Progression Free Survival

Haz Ratio: Sym/Asym = 8.5131
(p = 0.0024)

Multivariate

Progression Free Survival

Haz Ratio: Sym/Asym = 3.2453
(p = 0.0914)
Supplemental Figure 51

The influence of pre-operative symptoms on outcome for virgin lipomas after total resection. Kaplan-Meier analysis for asymptomatic virgin and symptomatic virgin lipomas after total resection. Progression-free probability at 20 years for asymptomatic virgin lipomas is 98.8%, versus 75.6% for symptomatic virgin lipomas. The difference is significant (p = 0.006 by Log-rank and 0.021 by Wilcoxon). Pt = patients; Asymptom = asymptomatic virgin lipomas; Symptom = symptomatic virgin lipomas. (Reprinted from: Pang D, Zovickian J, Wong ST, Hou YJ, and Moes GS. Surgical treatment of complex spinal cord lipomas. Childs Nerv Syst (2013) 29:1485-1513; with Permission from Springer Nature)

Supplemental Figure 51: