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WEDGE OSTEOTOMY OF SPINE IN ANKYLOSING SPONDYLITIS

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Severe ankylosing spondylitis often leads to complete ankylosis of the spine, sometimes with pronounced kyphosis. The kyphosis is due, among other things, to the patient sleeping with too many pillows under his head because of the nocturnal pain.

Extreme kyphosis causes thoracic and abdominal pain and, what is more, limitation of the distance the patient can see ahead of him. Sometimes the axis of vision is directed almost perpendicular to the ground. In such cases the patient cannot use busy thoroughfares.

Smith Petersen, Larsson & Aufranc (1945) were the first to describe wedge osteotomy of the spine. Since then several large series have been published by Herbert of Aix le Bain, and others. *La Chapelle* (1946) used a two stage procedure: first wedge osteotomy from behind through the spinous processes and arches and, after an interval of some weeks, chiselling through the vertebra or dividing the anterior longitudinal ligament from an anterior approach.

Herbert (1955) has performed 42 wedge osteotomies in various parts of the spine, including 3 in the cervical region, 1 in the upper thoracic region, 9 in the lower thoracic region and the rest in the lumbar region. In 10 cases he used the two-stage procedure. Complicating paraplegia occurred in 3 cases, in 2 of which it disappeared after decompression, while in the third it persisted and the patient died.

Briggs, Keats & Schlesinger (1947), *Law* (1949) and *Adams* (1952) preferred immediate correction on the operating table as well as fusion. *Kallio* (1963) reported 1 case in which he performed a one stage operation with immediate correction and fixed the spinous process with a loop made of a long piece of skin.

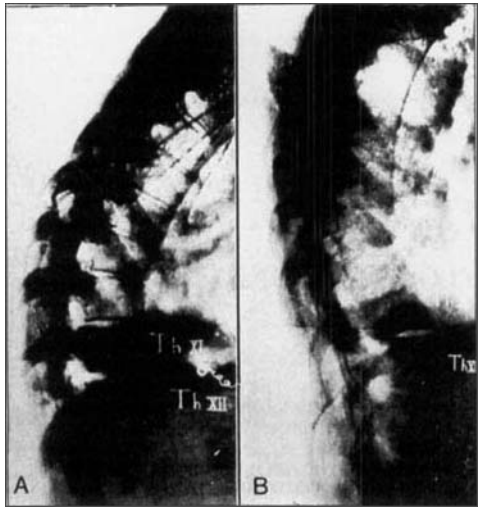

Figure 1 A. Case 1. Thoracic spine before operation. The pseudarthrosis is located between Th XI and XII.

Figure 1 B. Case 1. Thoracic spine 3 weeks after osteotomy. Observe how the pseudatrthorsis has functioned as part of the wedge osteotomy.

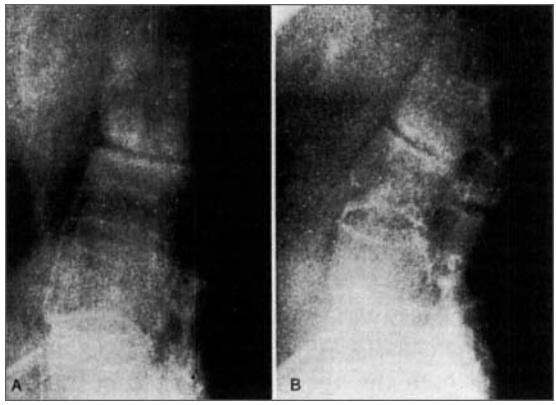

Figure 2 A. Case 5. Lumbar spine before operation. Observe the assumed pseudarthrosis just above the middle of the reproduction.

Figure 2 B. Case 5. Lumbar spine after osteotomy. Observe how the osteotomy has been done. The pseudarthrosis was not true but only apparent. The disk was immovable. Therefore the vertebrae was chiselled through from behind and the spine corrected.

From 1950 to 1962 five patients were subjected to wedge osteotomy at Lund, always because the patients were unable to look forward. The patients also had other symptoms such as respiratory difficulties, abdominal discomfort and pain, but not sufficient to indicate operation. Candidates for osteotomy must be selected very carefully for rehabilita-

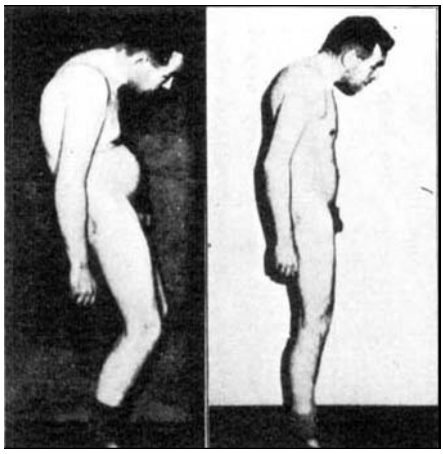

Figure 3. Case 1 before operation (left) and 10 months after osteotomy (right).

tion requires a long time. In other words the operation should be considered only when it has much to offer.

The 5 osteotomies were performed as one stage operations with a wedge osteotomy posteriorly and then gradual redresssement in a plaster cast for 3 weeks.

What we found useful in the one stage operation was that some patients had a "pseudarthrosis" between two vertebral bodies of the otherwise ankylotic spine. Such "pseudarthosis" may, perhaps, be due to a fracture of the bamboo spine.

In all of the cases such a "pseudarthrosis" could be observed and we performed the osteotomy at that level. We found, however, that the "pseudarthrosis" was not always true but only apparent. See Figures 2A and 2B.

The operation requires patience on the part of the surgeon. Two thirds of the circumference of the dural sac must be exposed. To judge the size of the wedge we used stainless steel plates of 15°, 20° and 30°. Dural injury could be avoided in 4 of the 5 cases. The escape of fluid in the 5th case was not troublesome and caused no secondary complication. Anaesthesia may be problematic. General anaesthesia is not satisfactory since the patient is prone during the operation and since the thoracic cage is completely rigid. Intubation is practically impossible. Local anaesthesia may be used but it places large demands on the patient. We have found extradural anaesthesia very satisfactory and it is probably the best method available for such patients. The case reports are given in Table 1.

It is clear from the Table that the postoperative period of immobili-

Table 1.

Age, sex. Year of operation	Interval between onset of disease and op. (yr)	Level of osteotomy and anaesthesia	Redressement period after op. (wk)	Immob. in plaster cradle (wk)	Plaster corset (mth)	Improvement in angle	Postop. compl.	Interval between op. and review and results
1.* 43 yrs ♂ 1950	9	Th XI–XII local	6 weeks	15	9 months	25°	Spasmodic pain. Slight lip cyanosis	11 yrs. Very satisfied, no disability. Angle of vision decreased a few degrees.
2.* 47 yrs ♂ 1951	27	L:I–L:II local	3 weeks	7	5 months	20°	Slight abdominal discomfort	8 yrs. Very satisfied, no disability. Angle of vision decreased a few degrees.
3. 43 yrs ♂ 1958	13	Th XI–XII local	3 weeks	12	6 months	30°	Slight decubitus over sacrum	7 yrs. Very satisfied. Felt very well first years. Then arthritis of hips. Disability pension
4. 32 yrs ♂ 1962	13	L:III–L:IV extradural	3 weeks	11	5 months	20°	Sec. pseudarthros. Reop. with fusion 18 months later	3 yrs. Satisfied. Works after vocational training. Sedentary occupation. Angle of vision decreased a few degrees
5. 42 yrs ♂ 1962	12	L:I–L:II extradural	3 weeks	12	7 months	24°	Meteorism	2 yrs. Very satisfied. Works as a clerk. No decrease of angle of vision

* Case 1, and Case 2 reported by Wiberg, G. (1952) *Nord. Med.* **48**, 1530.

sation is long, 7–15 weeks in a plaster cast, including 3 weeks for redressement, and then the use of a plaster corset for 5–9 months. Complications occurred in one patient (Case 4) who developed pseudarthrosis at the site of the osteotomy: when he was recumbent the spine was relatively straight, but when he stood up it flexed 20° and he was thus unable to look ahead. 1½ years after first surgery he was reoperated upon and fused with an iliac graft and bone chips. He is now able to do certain kinds of work. All of the 5 patients are satisfied with the result of the operation.

Patient No. 3 developed arthritis of the hip 2 years after the operation but nevertheless considered that the improvement of the axis of vision was extremely valuable. Patient No. 3 is the only one who cannot work and who has therefore been granted a disability pension.

SUMMARY

In patients with a bamboo spine, extreme kyphosis and consequent downward direction of the axis of vision, wedge osteotomy of the spine may be indicated. The operation places large demands on the surgeon's patience, but is not hazardous. The rehabilitation period is long, but all 5 patients operated upon in Lund between 1950 and 1962 are more than satisfied with the relief the operation has given.

RESUME

Chez les malades ayant une colonne vertébrale en forme de "bamboo", extrême cyphose et par conséquent une inclinaison de l'axe de vision, une ostéotomie en coin de la colonne peut être indiquée. L'opération requiert beaucoup de patience de la part du chirurgien, mais elle n'est pas hasardée. La période de traitement est longue, mais tous les 5 malades opérés à Lund entre 1950 et 1962 ont été extrêmement satisfaits du soulagement que l'opération leur a apporté.

ZUSAMMENFASSUNG

Bei Patienten mit einer Bambuswirbelsäule, extremer Kyphose und folgender Abwärtsrichtung der Sehachse, kann Keilosteotomie der Wirbelsäule angezeigt sein. Die Operation erfordert grosse Geduld von seiten des Chirurgen, ist aber nicht gefährlich. Die Wiederherstellungszeit ist lang, aber alle 5 Patienten, die zwischen 1950 und 1962 in Lund operiert

wurden, sind mehr als zufrieden mit der Erleichterung, die ihnen die Operation gebracht hat.

REFERENCES

Adams, J. C. (1952) *J. Bone Jt Surg.* **34** B, 226.
Briggs, H., Keats, S. & Schlesinger, Ph. P. (1947) *J. Bone J. Surg.* **29**, 1075.
La Chapelle, E. H. (1946) *J. Bone Jt Surg.* **28**, 851–858.
Herbert, J. J. (1955) Memoire de L'Aacadémie de Chirurgie, Nos 4 et 5.
Kallio, K. E. (1963) *Ann. Chir. Gynaec. Fenn.* **52**, 615.
Law, A. (1949) *Proc. roy. Soc. Med.* 594–597.
Smith Petersen, M. N., Larsson, C. B. & Aufranc, O. E. (1945) *J. Bone Jt Surg.* **27**, 1.
Wiberg, G. (1952) *Nord. Med.* **48**, 1530.