International Orthopaedics (SICOT) (1997) 21: 176–180

International
Orthopaedics

Retrograde ejaculation after retroperitoneal lower lumbar interbody fusion

F. B. Christensen, C. E. Bünger

Spine Section, Department of Orthopaedic Surgery, Aarhus University Hospital, Aarhus, Denmark

Accepted: 3 December 1996

Summary. *We have studied the incidence and functional outcome of retrograde ejaculation as a postoperative complication of anterior lumbar interbody fusion. A questionnaire, specifically designed to analyse this problem, has been used over a 6 to 13 year follow-up. Out of 50 men, 41 completed the questionnaire; 2 complained they had permanent retrograde ejaculation after the operation; one stopped ejaculating for 6 months, and thereafter had a 50% reduction. The Dallas pain questionnaire showed that retrograde ejaculation did not have a negative effect on the functional outcome, but male genital dysfunction was a complication of anterior spinal fusion in 8% of cases.*

Résumé. *Au cours des années soixante et soixante-dix, certains auteurs émirent des inquiétudes au sujet du nombre de cas d'impuissance et de stérilité, complication postopératoire parmi les patients ayant subi une fusion intervertébrale antérieure lombaire (ALIF). Récemment, les techniques de fusion antérieure ont gagné en popularité, du fait de nouvelles méthodes. Dans ce contexte, la fréquence des dysfonctions des organes génitaux mâles n'a pas été établie. Notre but était donc d'étudier le taux et les conséquences fonctionnelles d'éjaculation rétrograde en tant que complication postopératoire. Cette étude contient un questionnaire postopératoire sur 6 à 13 ans, conçu pour analyser spécifiquement les complications concernant les dysfonctions des organes génitaux mâles, complications successives à une fusion retropéritonéale des vertèbres lombaires (ALIF). L'examen contient également une section rétrospective basée sur des dossiers de patients et sur l'étude postopératoire de 6 à 13 ans, étude basée sur un questionnaire – Le «Dallas pain questionnaire» (DPQ). Sur un total de 50 patients mâles, 41 patients, ce qui représente un taux de 82%, répondirent à ce questionnaire. Deux patients déclarèrent avoir souffert d'éjaculation rétrograde de façon permanente, suite à la fusion antérieure. Un patient a, pendant 6 mois, connu une impossibilité totale d'éjaculation, suivie d'une réduction de volume d'environ 50%. Les réponses au DPQ n'ont montré aucun effet négatif d'éjaculation rétrograde par rapport à des conséquences fonctionnelles. Cette étude montre que dans au moins 8% des cas, la dysfonction des organes génitaux mâles est considérée directement imputable à une fusion vertébrale antérieure.*

Reprint requests to: F. B. Christensen, Biomechanics Laboratory, Aarhus University Hospital, Norrebrogade 44, DK-8000 Aarhus C, Denmark

Introduction

The first results of anterior lumbar interbody fusion were described in 1932 [2], and since then there have been many reports of the technique, results and complications [6, 10, 14, 15, 20, 21]. Male genital dysfunction was recognised as a complication in the 60s and 70s [4, 7, 13, 16], and an incidence of up to 20% has been reported using the transperitoneal approach [19]. Some surgeons have been deterred from carrying out these pro-

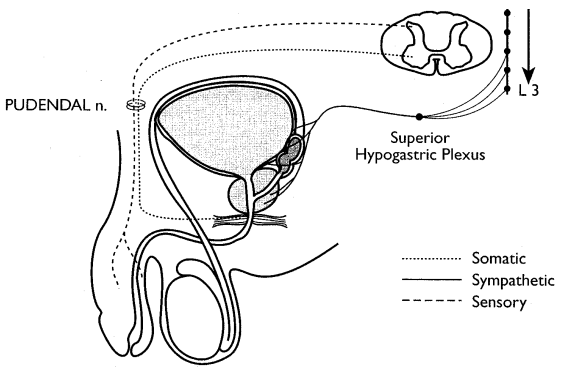

Fig. 1. Diagram showing the sympathetic chain (*T10-L3*), superior hypogastric plexus and the somatic and sensory components of the ejaculatory system

cedures as a result, but new implants, such as cages and disc replacements, have again favoured the anterior approach.

Retrograde ejaculation is well recognised as a complication of major spinal cord injuries, diabetes mellitus and after prostatectomy [1, 3, 5, 8, 11, 12, 17, 22], and is defined as the propulsion of seminal fluid from the posterior urethra into the bladder [12]. It is caused by lesions of the efferent adrenergic fibres of the sympathetic chain (T10-L3) which innervate the base of the bladder, preventing semen from entering during ejaculation (Fig. 1).

The first aim of this study was to identify the risk of producing male genital dysfunction as a complication of anterior lumbar interbody fusion when using a retroperitoneal approach. Secondly, to determine whether retrograde ejaculation was permanent. Thirdly to study, by means of the Dallas Pain Questionnaire (DPQ), the influence of this symptom on the functional outcome and to correlate these results with those who did not complain of retrograde ejaculation.

Patients and methods

From 1979 to 1988, we carried out 132 anterior lumbar interbody fusions (ALIF), 56 being on men. Two died after operation from thrombo-embolic complications, and within the next 2 years 2 died from unrelated causes and 2 emigrated to another country. Thus 50 men were available for follow-up in 1994.

A Dallas Pain Questionnaire (DPQ) [9] and a specially designed questionnaire concerning postoperative complications, such as genital dysfunction, were sent out and 41 (82%) were returned (Fig. 2).

The mean age at operation was 37 years (range 22 to 55 years).

Radiological assessment was undertaken by 2 independent observers at the 2 year follow-up.

Operative technique

ALIF was performed by Thomasen's technique [18] using a retroperitoneal approach to the L4 or L5 discs through a lower left paramedian incision. At the L5 level, dissection was done medial to the left iliac vein by mobilisation of the peritoneum and the left ureter, and by mobilisation or division of the medial sacral vein and fatty tissue. Access to the L4 disc was lateral to the left iliac artery and aorta. Rubber-coated Steinmann's pins were used to hold the vessels out of the way. The intervertebral space was cleared of all disc tissue and the endplate removed with a chisel. An autologous bone graft

- **Have you observed any changes in your urination pattern after your anterior lumbar procedure?**

  Yes __
  No __
  Do not know __

  If yes, how has it changed? _____

  How long did they last?

  Weeks___ Months___ Years___

- **Have you had any problems with ejaculation related to sexual activity after surgery?**

  Yes __
  No __
  Do not know__

  If yes, what was your problem ? _____

  How long did they last?

  Weeks ___ Month ___ Years ___

Fig. 2. Additional questions concerning retrograde ejaculation after anterior lumbar interbody fusion

Table 1. The functional outcome scores using the Dallas Pain Questionnaire (DPQ) in the groups with and without retrograde ejaculation. Retrograde ejaculation does not influence the functional outcome

	Median	(range,	n)	
Daily activity				
Retrograde ejaculation group	26	12–62	3	
Non-complaining group	24	0–76	26	ns
Work/leisure time				
Retrograde ejaculation group	25	10–35	4	
Non-complaining group	30	0–90	25	ns
Anxiety/depression				
Retrograde ejaculation group	10	0–40	4	
Non-complaining group	10	0–75	26	ns
Social function				
Retrograde ejaculation group	5	0–15	4	
Non-complaining group	10	0–65	26	ns

taken from the ipsilateral iliac crest was placed with the spine in lordosis. Antibiotics and anticoagulants were not used until after 1989.

Dallas Pain Questionnaire and radiography

The functional result was evaluated using a Danish version of the DPQ [9] with 16 questions analysing the relation of chronic back pain to daily activity, work and leisure activity, anxiety or depression, and social function. The radiographic assessment was carried out by two persons independently; neither was the surgeon. Bony union was classified as complete, incomplete or nonunion.

Statistical methods

The DPQ scores from the retrograde ejaculation group and a group of the remaining patients were compared using the Mann-Whitney' rank sum test. The results were expressed as median (range, n). Five per cent limits of significance were used.

Results

The diagnostic categories were spondylolisthesis (25) and degenerative disease (25). There were 12 patients with fusion at the L4/L5 level and 28 at L5/S1, and 10 had a 2-level fusion.

Of the 41 who returned the questionnaire on genital dysfunction, 4 had problems with retrograde ejaculation (8%). None had any change in their erections or orgasm.

Case 1

Age 22 years. He had an L4/L5/S1 fusion for spondylolisthesis and reported immediate cessation of ejaculation after the operation; this became permanent. Radiographs showed complete union at L5/S/1, but nonunion at L4/L5. The functional result was satisfactory. He worked before operation and was working at the 2 years follow-up.

Case 2

Age 48 years. He had an L5/S1 fusion for disc degeneration and problems with ejaculation afterwards which became permanent. Radiographs showed incomplete union. The functional outcome was satisfactory and there was no change in the psychosocial outcome. He was working before operation, but was not doing so at follow-up.

Case 3

Age 31 years. He had an L5/S1 fusion for spondylolisthesis. He was unable to ejaculate for 6 months after operation, after which the amount of seminal fluid was reduced by 50%. Radiographs showed incomplete union of the fusion. The functional result was satisfactory. He was not working before operation, but he was working at the 2 year follow-up.

Case 4

Age 52 years. He had an L4/L5/S1 fusion for disc degeneration and complained of retrograde ejaculation, but gave no further information. Radiographs showed complete union. He did not fill in the DPQ describing his function after operation.

None of the 4 cases suffered from diabetes mellitus or had prostatic surgery. In addition, 4 found that the amount of seminal fluid had decreased (11%), and 5 answered 'I don't know'. Twenty-eight (68%) had no problems. The 37 pa-

tients who did not have retrograde ejaculation comprise a group for comparison.

This study did not show any negative effect of sexual dysfunction on the functional outcome (Table 1) when the 2 groups were compared.

Discussion

Retrograde ejaculation is the propulsion of seminal fluid from the posterior urethra into the bladder. This indicates that the fluid reaches the prostatic urethra and ejaculation is intact, but there is patency of the bladder neck which allows the retrograde flow. Normally, ejaculation consists of well-timed neuromuscular events and injury to the nerves or muscles involved may result in diminished fertility or infertility. The process is separate from erection and orgasm.

The excitatory stimulus for ejaculation has not been clearly defined, but is under the control of the sympathetic system [3, 5, 11, 12, 17, 22]. The bladder is supplied with cholinergic and α-adrenergic fibres, and stimulation of the latter creates the posterior barrier which prevents seminal fluid entering the bladder [17]. Damage to these nerves may result in retrograde ejaculation or no ejaculation at all. Retrograde ejaculation may be associated with diabetes mellitus, transurethral prostatic resection, trauma and certain spinal cord diseases. It is also reported in 10% of patients who have an aortic graft by a retroperitoneal approach [7], but one third regain normal ejaculation over 2 or 3 years.

Flynn and Hoque studied sexual dysfunction after ALIF in 34 men and found no retrograde ejaculation [4]. They contacted other surgeons worldwide who reported no cases of this complication either.

The question arises as to whether, if the patient is not specifically asked about retrograde ejaculation, it is possible to be sure that the problems do not exist. Before we sent out the questionnaire we were not aware of these difficulties.

Of the 50 men who received a questionnaire, 82% returned it and 3 described retrograde ejaculation precisely. Case 1 was young and should be told of possible problems with infertility and the treatment for the condition. Sperm for artificial insemination can obtained from the bladder by direct voiding or catheterisation and irrigation. Some men may respond to α-sympathicomimetic drugs and return to normal ejaculation.

Cases 2 and 3 also had a satisfactory functional outcome. Case 3 had a permanent reduction of seminal fluid by 50%, but regained ejaculation after 6 months.

Our results show that sexual dysfunction is a complication of ALIF at L5/S1 level which must be taken seriously when considering the operation. A post-ejaculatory urine sample should be checked for sperm, but unfortunately this was not done in our study. The possibility of these complications should be discussed with the patients before operation. All men should be asked about these problems after operation, and those with sexual dysfunction should be referred to a fertility clinic.

References

1. Bell G, Reid W, Ewing D, Cumming A, Watson M, Doig A, Clarke B (1987) Abnormal diurnal urinary sodium and water excretion in diabetic autonomic neuropathy. Clin Sci 73: 259–265
2. Capener N (1932) Spondylolisthesis. Br J Surg 19: 374–386
3. Ellenberg M (1982) Diabetes and sexual function. NY State J Med 82: 927–930
4. Flynn J, Hoque M (1979) Anterior fusion of the lumbar spine. J Bone Joint Surg [Am] 61: 1143–1150
5. Greene L, Kelalis P (1968) Retrograde ejaculation of semen due to diabetic neuropathy. J Urol 98: 693–696
6. Greenough C, Taylor L, Fraser R (1994) Anterior lumbar fusion: results, assessment techniques and prognostic factors. Eur Spine J 3: 225–230
7. Humphries A, Hawk W, Berndt A (1961) Anterior fusion of lumbar vertebrae: a surgical technique. Surg Clin North Am 41: 1685–1700
8. Kolodny R, Kahn C, Goldstein H, Barnett D (1973) Sexual dysfunction in diabetic men. Diabetes 23: 306–309
9. Lawlis GF, Cuencas R, Selby D, McCoy CE (1989) The development of the Dallas Pain Questionnaire. An assessment of the impact of spinal pain on behavior. Spine 14: 511–516
10. Meril A (1994) Direct current stimulation of allograft in anterior and posterior lumbar interbody fusion. Spine 19: 2393–2398
11. Newman H, Northup J (1983) Problems in male organic sexual physiology. Urology 21: 443–449
12. Rieser C (1961) The etiology of retrograde ejaculation and a method for insemination. Fertil Steril 12: 488–492
13. Sidney S (1965) Anterior interbody fusion of the lumbar spine. J Bone Joint Surg [Am] 47: 211–223
14. Sørensen K (1978) Anterior interbody lumbar spine fusion for incapacitating disc degeneration and spondylolisthesis. Acta Orthop Scand 49: 269–277
15. Takahashi K, Kitahara H, Yamagata M, Murakami M, Takata K, Miyamoto K, Mimura M, Akahashi Y, Moriya H (1990) Long-term results of anterior interbody fusion for treatment of degenerative spondylolisthesis. Spine 15: 1211–1215
16. Taylor T (1970) Anterior interbody fusion in the management of disorders of the lumbar spine. J Bone Joint Surg 52
17. Thomas A (1983) Ejaculatory dysfunction. Fertil Steril 39: 445–453

18. Thomasen E (1985) Intercorporal lumbar spondylodesis. 312 patients followed for 2–20 years. Acta Orthop Scand 56: 287–293
19. Tiusanen H, Seitsalo S, Österman K, Soini J (1995) Retrograde ejaculation after anterior interbody lumbar fusion. Eur Spine J 4: 339–342
20. Tomita K, Kawahare N, Tsuchiya H, Nagata S, Toribatake Y (1994) Total en bloc spondylectomy for solitary spinal metastases. Int Orthop 18: 291–298
21. van Akkerveeken PF (1993) Anterior lumbar interbody fusion. Acta Orthop Scand [Suppl] 251: 105–107
22. Zemel P (1988) Sexual dysfunction in the diabetic patient with hypertension. Am J Cardiol 61: 27H–33H