

Semen Retrieval in Spinal Cord Injured Men

H. B. Rawicki, MB, BS, FACRM,¹ S. Hill, MB, BS, FACRM²

¹Director Spinal Rehabilitation, Caulfield General Medical Centre, 260-294 Kooyong Road, Caulfield 3162, ²Hampton Rehabilitation Hospital, Beach Road, Hampton, Victoria, Australia.

Summary

A fertility programme for spinal cord injured men has been in progress for nearly 5 years. Thirty eight men have been treated in this programme. Electroejaculation, vibration ejaculation and subcutaneous physostigmine have all been used successfully to obtain semen. Semen has been obtained from 21 of 24 men with a lesion at T8 or above, and from 4 of 11 men with lesions below T10. There have been 8 pregnancies from 6 couples.

Key words: *Electroejaculation; Vibration ejaculation; Subcutaneous physostigmine; Fertility; Spinal cord injury.*

Infertility is a usual consequence of spinal cord injury (SCI) in men. With a complete lesion and without intervention only 1% of men are fertile.^{1 2} Collated reports suggest that without intervention approximately 14% of men with a complete lesion are able to ejaculate.^{1 3} Irrespective of whether ejaculation is aided or unaided semen quality is usually poor, and in particular sperm motility is low.⁴⁻⁶ Therefore, to significantly improve fertility in this group of men efforts must be made to improve the rate of semen collection as well as improving semen quality.

We have been running a fertility enhancement programme for SCI men since 1985. During this time we have seen 39 men, almost always with their partners, for the purpose of either directly intervening to improve fertility, or rarely to give these men some idea whether it is possible that they are fertile. This paper will concentrate on the results of our work with semen retrieval.

Method

All men were asked to try masturbation if they had not already done so, and in addition, where masturbation was unsuccessful a post masturbation sample of urine was examined looking for retrograde ejaculation before embarking on more invasive procedures. When masturbation failed intervention was undertaken.

There are now three safe and relatively easy methods for increasing semen retrieval. These are electroejaculation (EE), vibration ejaculation (VE) and subcuta-

neous physostigmine (SP). EE was the first method of artificial ejaculation that we tried and remains one of the most successful methods. EE was first used by Horne in 1948 who obtained semen from 11 of 18 men.⁷ Our current equipment delivers a continuous sine wave current of 30 volts at 10Hz through a rectal probe. This directly stimulates the sympathetic nerves to the seminal vesicles and ampulla of the vas deferens causing semen emission.⁸ For EE to be successful the T10-L1 spinal segments must be intact. Side effects included a high incidence of autonomic hyperreflexia (AH) in those men with high lesions, and pain in those men with incomplete or low lesions. One of the authors (HBR) had performed EE on 3 men under general anaesthetic because of the pain problem.

VE entails a vibratory stimulus applied to the glans, frenulum or occasionally the base of the penis which causes a reflex ejaculation rather than semen emission.^{9 10} Our equipment has been modified to vibrate at 80Hz. Ejaculation in our series has been preceded by erection in each case, whereas with EE this is not always so. Again, at least T10-L1 must be intact, and we have not tried VE in patients with lesions below T12. Side effects of VE included AH and in two men superficial trauma to the glans resulting in bruising in one man on one occasion, and a superficial ulcer in the other man also on one occasion.

SP is a development from intrathecal prostigmine which was initially used by Guttmann in the 1960s⁴ but has been all but abandoned due to the unacceptable incidence of serious side effects. SP was first used by Chapelle¹¹ in 1983. Physostigmine is a lipid soluble acetylcholinesterase inhibitor and thereby acts as a parasympathomimetic agent which is able to cross the blood-brain barrier. The parasympathomimetic activity within the spinal cord allows an increased sensitivity to reflex activity and hence improves success rates with either masturbation or VE. It is necessary to first give a peripherally acting anticholinergic agent (Buscopan 40 mg i.m.) to prevent severe cholinergic side effects. Again for this method to work the T10-L1 spinal segments must be intact.¹¹

Side effects with SP include a high incidence of blurring of vision with the Buscopan (4/5 men), nausea and sometimes vomiting (2/5), and in 2 of the 5 men who have had this treatment 'marijuana like highs' that have lasted up to 1 hour.

We have now treated 35 men with different combinations of the above methods (4 men presented for information only). VE is always tried first as this is the simplest for couples to use unaided at home. Where this fails SP is tried and finally EE. We have only been using SP since April 1989 and although we did make some attempts with VE prior to 1989 it is only since January 1989 that there has been a consistent effort with this method.

Retrograde ejaculation has occurred in at least 4 patients. In two of these this problem has been overcome by tamponading the bladder neck with a 30 ml catheter balloon during ejaculation. This has provided external ejaculation in both men. One other male, a very incomplete L5 paraplegic with an artificial urinary sphincter, found the urinary catheter very uncomfortable and preferred post ejaculation voiding (first alkalising his urine) and semen retrieval following masturbation. His wife is now pregnant.

Results

The results are shown in the Table. Three men were able to achieve an external

Table

Level	VE	SP	EE	MAS	Total
C4-7	2/3	2/2 (1RE)	7/9 (2RE)	1/13	12/13
T3-8	1/4	1/1	6/7	2/11	9/11
C4-T8	3/7	3/3	13/16	3/24	21/24
T10-12	1/2	1/2	1/7	1/10	3/10
L5				1/1 (1RE)	1/1
Total	4/9	4/5	14/23	5/35	25/35

Note that a number of patients have tried more than one method to achieve an ejaculate.

RE=Retrograde ejaculation

MAS=Masturbation

ejaculate with masturbation prior to our initial consultation. From the Table it can be seen that with intervention there is a high chance of obtaining semen in men with lesions at T8 or above. Semen was obtained as an external ejaculate in 18 men and in a retrograde fashion in 3 men (total 21) of the 24 men in this group. Semen could be obtained from only 3 of 10 men with lesions T10-12. Each of these 3 men had an incomplete lesion. Fifteen couples have participated in a programme for 6 months or longer and as a result there have been 8 pregnancies from 6 couples including 1 using in vitro fertilisation and a donor (wife's sister) egg.

All men with lesions C7 or above suffered some degree of AH. Where necessary (increase in BP>40/30; systolic BP>150; symptoms) this was treated prophylactically with either Labetolol 100 mg p.o. or Nifedipine 10 mg p.o. 30 minutes prior to ejaculation. This has been adequate treatment in all patients.

Conclusion

All three available methods of artificial ejaculation offer significant prospects of achieving an ejaculate. The level of the lesion is very important in determining the prospects of success in semen retrieval, and for patients with lesions above T10 and incomplete lesions below T10 semen retrieval is a realistic goal for use with artificial insemination. In these men the major objective must be to improve the quality of obtained sperm so as to further significantly improve prospects for fertility.

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