The spinal control of ejaculation revisited. A systematic review and meta-analysis of anejaculation in spinal cord injured patients

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Introduction

After spinal cord injury (SCI) most men cannot ejaculate without medical assistance. Ejaculation comprises two successive phases:

- emission controlled by parasympathetic (segments T2 to S4) and sympathetic (segments T12 to L2) spinal centres
- expulsion controlled by somatic (segments S2 to S4) spinal centres

In rat, a spinal generator of ejaculation (SGE), located in third and fourth lumbar spinal segments (L3 and L4), controls emission and expulsion [1], [2]. Such a SGE have not been yet identified in man.

Clinical studies about ejaculation after SCI have been reviewed in order to revisit the spinal control of ejaculation and assess the existence of a SGE in man.

Material and Methods

Studies were identified from Embase, PubMed, EBSOHost and Cochrane Library and considered for analysis when they specified the occurrence of anegetrate ejaculation as a function of the neurological characterisation of SCI. Meta-analyses were performed to assess reference ejaculation rates for each procedure used to elicit ejaculation i.e.

- masturbration or coitus
- penile vibratory stimulation (PVS)
- acetylcholine esterase (AchE) inhibitors prior to masturbation

Subgroup analyses were performed according to the procedure used to elicit ejaculation on the
i) completeness of the SCI
ii) upper and lower limits of the SCI
To assess the existence of SGE, the effect of concurrent lesions of different spinal segments was assessed by means of a stratified bivariate analysis

Results

45 studies were selected (including 3851 patients). Ejaculation occurred in response to:

Masturbation or coitus 16% (n=2509 patients)
Penile vibratory stimulation (PVS) 52% (n=1911 patients)
AchE inhibitors followed by masturbation 57% (n=341 patients)

Ejaculation occurred in response to PVS or AchE inhibitors followed by masturbation in:
(i) 3/65 (5%) of patients with complete lesion of the sympathetic centres (T12 to L2)
(ii) 8/41 (20%) of patients with complete lesion of parasympathetic and somatic centers and
(iii) 0/67 (0%) of patients with complete lesion of all spinal ejaculation centres (T12 to S5).

Complete lesion of the S2 to S4 segments precluded the occurrence of rhythmic forceful ejaculation.

Ejaculation rates, with 95% confidence intervals, during masturbation following intrathecal proglandine or sub cutaneous phystostigmine in patients with complete spinal cord injury according to the status of each spinal segment irrespective of the others :

(a) Ejaculation rate according to the upper limit of SCI
Intact lower thoracic and upper lumbar segments were associated to a high probability to ejaculate. There was a trend for a maximal ejaculation rate when segment L2 and/or L3 and/or L4 were intact.

(b) Ejaculation rate according to the location of complete SCI
Complete lesion of a spinal segment below T10 was associated with a step decrease in ejaculation rate with the lowest rate observed with complete lesion of L3.

(c) Ejaculation rate according to the location of the lower limit of SCI
The more cranial the lower limit of the lesion, the higher the likelihood of ejaculation with a maximum rate when L2 and/or above segments were infra lesional.

Controlling for the number of the injured segments between T12 and L2, ejaculation rate sharply decreased when the lesion extended to the segment L3 and below

Conclusion

The results reinforce the crucial roles of the spinal parasympathetic and sympathetic centres for emission and the somatic centre for expulsion. This analysis suggests the existence of a SGE in man, located in L3-L5 segments.