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Update on urodynamic bladder dysfunctions after radical hysterectomy for cervical cancer

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Contents

1. Introduction 323
   1.1. Pelvic floor neuro-anatomy 324
2. Materials and methods 324
   2.1. Data sources 324
   2.2. Study selection and eligibility criteria 324
   2.3. Evaluation of studies 325
3. Results 325
4. Discussion 325
5. Conclusion 328
   Conflict of interest 328
   Reviewers 328
   References 328
   Biography 329

Abstract

Introduction: Bladder dysfunctions are a common sequela after radical hysterectomy (RH, former type III sec Piver) ranging from 8 to 80%. This discrepancy, probably, reflects the different bladder function evaluation methods utilized in literature.
Material and methods: We searched English-language medical reports published from 1952 to 2010, on MEDLINE. Inclusion criteria were: (1) studies of urological dysfunctions in patients with cervical cancer, treated with type III sec Piver (C2 sec Querleu) radical hysterectomy; (2) use of urodynamic measurement.
Results: The overall incidence of urodynamic bladder dysfunctions is 72%. Follow-up >12 months studies report a high incidence of overactive detrusor low compliance (34%). Eight out of 19 studies show a decrease of the maximal urethral closure pressure (MUCP).
Discussion and conclusions: Follow-up timing seems to be the major factor influencing the wide range of incidence of bladder dysfunction. Urodynamic data could help physicians to formulate appropriate evaluation and treatment for patients having urge incontinence (UI) after RH.

Keywords: Bladder dysfunction; Radical hysterectomy; Stress urinary incontinence; Mixed urinary incontinence; Urodynamic assessment

1. Introduction

Radical hysterectomy (RH) (type III sec Piver or C2 sec Querleu) is deemed the standard treatment of early-stage

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cervical carcinoma [1–4]. This surgical procedure can be performed also in patients with locally advanced disease who respond to neoadjuvant chemotherapy [5–7]. Wide parametrial resection to cure this malignancy requires excellent surgical technical skills. The surgical principles of this operation, first described by Wertheim, have undergone only minor modifications and remain the basis for the surgical approach utilized by gynaecologic oncologists today. For early stage 5-years survival is in excess of 90% [8,9], however the procedure conveys significant morbidity, particularly to the pelvic floor. During radical hysterectomy, pelvic nerves and fascial structures can be interrupted in the anterior, posterior and lateral parametrium, leading to various degrees of bladder dysfunction. Clinically significant bladder dysfunctions occur in majority of patients ranging from 8 to 80% [10–14]. This discrepancy (8–80%) reflects the different bladder function evaluation methods and different follow-up intervals utilized in the past studies.

In the last years, advances in urodynamic assessment techniques have facilitated exploration of the changes of lower urinary tract function prior to and subsequent to the management of patients with cervical cancer [15]. Nevertheless, it is difficult to determine from published results how much morbidity is caused by these functional disorders. The aim of this study is to analyze the published series on bladder dysfunctions, after radical hysterectomy for cervical cancer performed in the last years, employing urodynamic assessment.

1.1. Pelvic floor neuro-anatomy

The sympathetic fibers innervating the bladder arise from the para-aortic sympathetic chain at the T11–L2 level. These synapse in the superior mesenteric ganglion and course into the pelvis over the sacral promontory. They enter the pelvis via the hypogastric nerve, synapse in the pelvic plexus, and reach the bladder through the fixed bladder base. In the pelvic plexus, the fibers synapse with parasympathetic fibers from S2 to S4, which traverse the pelvis via the pelvic nerve and enter the pelvic plexus from either side of the rectum. The postganglionic fibers may be exclusively sympathetic, exclusively parasympathetic, or a combination. At the points of junction of these nerves small ganglia are found. From these plexuses numerous branches are distributed to rectum, cervix, lateral vagina and bladder. They accompany the branches of the hypogastric artery. Under normal conditions, the bladder and the internal urethral sphincter primarily are under sympathetic nervous system control. When the sympathetic nervous system is active, it causes the bladder to increase its capacity without increasing detrusor resting pressure (accommodation) and stimulates the internal urinary sphincter to remain tightly closed. The sympathetic activity also inhibits parasympathetic stimulation. When the sympathetic nervous system is active, urinary accommodation occurs and the micturition reflex is inhibited. The parasympathetic nervous system functions in a manner opposite to that of the sympathetic nervous system. In terms of urinary function, the parasympathetic nerves stimulate the detrusor to contract. Immediately preceding parasympathetic stimulation, the sympathetic influence on the internal urethral sphincter becomes suppressed so that the internal sphincter relaxes and opens. In addition, the activity of the pudendal nerve is inhibited to cause the external sphincter to open. The result is facilitation of voluntary urination. Sensation within the bladder is transmitted to the central nervous system through sensory afferent fibers of two types: proprioceptive nerve endings residing in collagen bundles, that respond to tension and convey a sense of bladder distension and free nerve endings in the bladder mucosa and submucosa, that are responsible for transmission of temperature, pain and irritation. Sensors exist in both the trigone and the bladder body. Urethral sensation is transmitted trough afferent nerves, which relay information regarding pain, temperature, urethral distension and passage of urine. Urethral smooth and striated muscle afferent nerve fibers travel in the pudendal nerve and terminate at the dorsal sacral cord, S2–S4. The autonomic fibers innervating the bladder can be disrupted at several stages during radical hysterectomy: during dissection of the presacral or superior gluteus nodes, during vaginal dissection and mobilization of the bladder and during resection of the cardinal ligament.

2. Materials and methods

2.1. Data sources

We searched English-language medical reports published from January 1952 to May 2010, on MEDLINE. We used keywords including: radical hysterectomy, vesical dysfunction, urinary incontinence, urodynamic assessment. In addition, we searched the reference lists from identified articles.

2.2. Study selection and eligibility criteria

A set of explicit criteria were used for selection of literature. For inclusion in this review, all the following criteria had to be fulfilled by the papers: (1) studies of urological dysfunctions in patients with histologically verified cervical cancer, treated with type III sec Piver (C2 sec Querleu) radical hysterectomy; (2) use of urodynamic measurement. We included studies that presented primary data. If data from multiple time points were published, we included only data for the longest time from surgery. Two of the authors (PF and SM) evaluated the studies independently, and discrepancies were resolved by consensus discussions. The reviewers evaluated the title and abstract of each citation to identify all studies including any possibility of an assessment of urological dysfunction after radical hysterectomy. All citations identified as being potentially eligible were retrieved for complete assessment. Reasons for exclusion were recorded on a citation assessment form. (Table 1)