

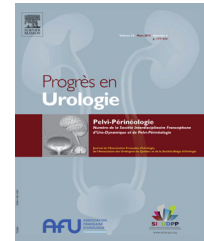


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## LITERATURE REVIEW

# Laser procedure for female urinary stress incontinence: A review of the literature

*Traitement laser de l'incontinence urinaire d'effort chez la femme : revue de la littérature*

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### KEYWORDS

Laser procedure;  
Stress urinary incontinence;  
Female;  
Phototherapy

### Summary

**Introduction.** – There is increasing interest in noninvasive treatment of female stress urinary incontinence (SUI), including a vaginal laser procedure. In view of a lack of data on this technique, we conducted a non-systematic review of the literature.

**Methods.** – We reviewed studies concerning the laser treatment of SUI from PubMed, Medline, the Cochrane Library and Web of Science. Study design, outcome measure, number of participants, procedural complications and results were analyzed.

**Results.** – The use of laser treatment of female SUI has been described in 7 prospective, single-center and non-comparative (no control group) studies, all of which used an erbium YAG or a CO<sub>2</sub> laser in thermal non-ablative treatment. Primary outcome was ICIQ-UI-SF score in six studies, and pad tests in one study. Follow-up ranged from 5 to 36 months. Improvement rates ranged from 62% to 78%. No major adverse events were noted. Minor side effects included sensation of warmth, increased vaginal discharge and transient urge urinary incontinence.

**Conclusion.** – The efficacy of vaginal laser treatment of SUI has not been assessed in comparative studies. More rigorous and adequately powered trials are required to assess the relative benefits and adverse event profile of laser treatment of SUI, as compared with other minimally invasive procedures.

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## MOTS CLÉS

Traitement laser ;  
Incontinence urinaire  
d'effort ;  
Femme ;  
Photothérapie

## Résumé

**Introduction.** — Il existe un intérêt croissant pour les techniques mini invasives de traitement de l'incontinence urinaire d'effort chez la femme, dont le traitement vaginal par laser. Étant donné le peu de données sur cette technique, nous avons mené une revue de la littérature sur le sujet.

**Méthodes.** — Nous avons sélectionné des études portant sur le traitement par laser de l'incontinence urinaire d'effort à partir des bases de données Pubmed, Medline, Cochrane Library et Web of Science. Le type d'étude, les critères de jugement, le nombre de patientes, les complications inhérentes au traitement et les résultats ont été analysés.

**Resultats.** — Le traitement de l'incontinence urinaire d'effort par laser chez la femme a été étudié dans 7 études prospectives, unicentriques et non comparatives (pas de groupe contrôle). Deux types de laser étaient utilisés : erbium YAG ou CO<sub>2</sub> sur un mode thermique. Le critère de jugement principal était le score ICIQ-UI-SF dans 6 études, le pad-test dans une seule étude. Le suivi variait de 5 à 36 mois. Le taux d'amélioration de l'incontinence urinaire d'effort variait de 62 à 78 %. Aucune complication majeure n'a été rapportée. Les effets secondaires mineurs rapportés étaient une sensation de chaleur, une augmentation des pertes vaginales et une incontinence urinaire par urgenturie transitoire.

**Conclusion.** — L'efficacité du traitement vaginal par laser de l'incontinence urinaire d'effort n'a pas été confirmée par des études comparatives. D'autres études plus puissantes et plus rigoureuses sont nécessaires pour évaluer les bénéfices et la tolérance du traitement par laser, comparés à d'autres techniques peu invasives de l'incontinence urinaire d'effort.

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## Introduction

Female stress urinary incontinence (SUI) is a lower urinary tract dysfunction defined as involuntary loss of urine on effort or physical exertion (e.g., sporting activities), or on sneezing or coughing [1,2]. With an estimated prevalence of 4–35% among adult women [3], SUI is thought to have a complex and multifactorial pathophysiology that relates to general weakening of the pelvic musculature and of collagen-dependent tissues involved in pelvic support [4]. Major risk factors for female SUI include pregnancy, vaginal delivery, parity, age, postmenopausal status and obesity [5]. Gynecological surgery for prolapse, hysterectomy and other gynecological procedures double the risk of SUI [6].

Initial non-surgical management includes behavioral therapy, pelvic floor muscle training and continence pessaries. Pelvic floor muscle training seems to be efficient, but studies show discordant results and the long-term benefits are unclear. Further clinical studies are needed. [7]. Surgical procedures (midurethral slings) are more effective and tension-free vaginal tape (TVT) has been considered the gold standard in SUI [4]. In France, TVT and TOT are recommended for the surgical management of female SUI [8,9]. However, midurethral slings are associated with side effects such as bladder perforation, urethral injury, bladder outlet obstruction and mesh exposure [10]. Therefore, less invasive procedures should be developed. Laser photothermal heating results in denaturation of collagen, which shortens along the longitudinal axis, resulting in collagen remodeling and collagen neogenesis. The treated tissue may then become enriched with new collagen, making it tighter [11,12]. This tensioning of the anterior vaginal wall may explain the therapeutic effect of the laser procedure on SUI. Collagen

is an important component of pelvic floor support structures. An increase in temperature breaks up intermolecular cross-links and stabilizes the collagen triple-helix structure, thus resulting in the shortening of collagen fibers. In order to achieve a shrinkage of collagen, without destroying its fibrillar structure, and stimulation of neocollagenesis, the temperature must be between 60°C and 65°C [13]. The idea is that laser-mediated heat pulsing of the pelvic floor tissue could be an effective non-surgical method for treating female SUI. Microscopic studies showed significant changes after Er:YAG laser in the main structural components of the vaginal wall mucosa. Studies of vaginal biopsy specimens before the exposure showed degenerative and atrophic changes in the stratified squamous epithelium, disorganization of fibrillar structures of the intercellular matrix, and microcirculatory disorders. Studies after Er:YAG laser exposure showed signs of neocollagenogenesis and elastogenesis, foci of neoangiogenesis, reduction of epithelial degeneration and atrophy, and an increase of the fibroblast population [14]. Erbium YAG laser technology is already used in dermatology and esthetic medicine and to treat vaginal tissue in some indications (human papilloma virus infections, cervical ectropion, vulvar intraepithelial neoplasia, dystrophic lesions, melanosis). IncontiLase® is a minimally invasive, non-surgical and non-ablative Er:YAG laser therapy for the treatment of SUI. Thermoablative fractional CO<sub>2</sub> laser (TACO2L) is a transvaginal laser used in the treatment of SUI.

Patients' increasing interest in these new technologies emphasizes the importance of this study, which may help physicians to inform their patients correctly. The aim of the current study was to analyze the literature concerning the

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