Fractional Pixel CO_2 laser treatment for decubitus ulcer in advanced pelvic organ prolapse: a case report

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ABSTRACT

Objective: Cervicovaginal decubitus ulceration is a complication of advanced pelvic organ prolapse that is very difficult to manage. Here, we report on the effectiveness of fractional CO2 laser treatment for a wide decubitus ulcer over an apical vaginal vault prolapse.

Methods: We report a case of a postmenopausal woman with a wide decubitus ulcer over a vaginal vault prolapse. A fractional microablative CO2 Pixel laser system (Alma Lasers, Cesarea, Israel), equipped with an appropriate probe for the vulva, was used to treat the ulceration of a 78-year-old patient across three laser sessions with 30-day intervals.

Results: A significant improvement in the decubitus ulcer was noted in a check-up held 2 months after the final laser session, with approximately 95% wound healing observed. No side effects were reported during or after the laser therapy.

Conclusions: This case demonstrates that fractional Pixel CO2 laser treatment is a viable option for managing decubitus ulcers before definitive surgery in postmenopausal women with advanced pelvic organ prolapse.

Keywords: CO_2 laser; Decubitus ulcer; Pelvic organ prolapse; Menopause

Pelvic organ prolapse (POP) is defined by herniation of the anterior vaginal wall, posterior vaginal wall, uterus, or vaginal apex into the vagina. Descent may occur in one or more of these structures.1

POP can cause bulging through the vaginal opening and may be associated with urinary incontinence, voiding dysfunction, pelvic pain, and sexual dysfunction.

Although POP can affect women of all ages, it more commonly occurs in older women. In the general population, an objective POP has been identified in up to 40% of women aged between 45 and 85 years on examination.2 Long-standing advanced POP or apical vaginal vault prolapse after total hysterectomy may present with decubitus ulceration over the protrusion due to chronic friction of the exposed cervicovaginal epithelium rubbing against clothing. This occurs due to localized tissue damage and venous congestion and has been estimated to occur in 3.3% to 50.6% of cases.3 Vaginal pessaries may aggravate decubitus ulceration in advanced POP by exerting focused pressure on already vulnerable tissue. In addition, these patients are not suitable for immediate surgery because the vaginal epithelium can be both atrophic and edematous, giving rise to concerns about tissue fragility and delays in postsurgical healing.

The use of different types of lasers has been demonstrated to relieve pain and result in a favorable wound healing in patients with decubitus/pressure ulcers, chronic venous insufficiency ulcers, recurrent aphthous stomatitis, and diabetic foot ulcers.4

Fractional CO2 lasers are also a new nonhormone therapeutic approach for the management of genitourinary syndrome of menopause.5

This treatment is suggested to act through the activation of heat shock proteins that in turn activate growth factors, resulting in an increase in vascularity, collagen, extracellular matrix production, and thickness of the vaginal epithelium.6 Here, we report a case of wide decubitus ulceration over an apical vaginal vault prolapse successfully treated with a fractional Pixel CO2 laser.

CASE REPORT

A 78-year-old white woman was referred to the outpatient gynecology clinic at the V. Buzzi Hospital-University of the Study of Milan presenting with a wide decubitus ulcer over a vaginal vault prolapse (Fig. 1). She was a gravida 1, para 1. Her medical history included type 2 diabetes mellitus in treatment with metformin. At the age of 55 years, she underwent spontaneous menopause and she had never used any hormone therapy.

She had undergone two previous surgical operations: a vaginal hysterectomy with anterior and posterior vaginal wall repair (McCall colporrhaphy) for POP+ stress urinary incontinence (October, 2016); and a vault suspension and uterosacral ligament plication for prolapse of the vaginal apex after hysterectomy (June, 2018). In February 2019, she underwent pessary placement for a recurrence of POP. In September 2019, the patient complained of vaginal discharge and bleeding due to a wide decubitus ulcer of the vaginal vault related to pessary use. She submitted to a biopsy, which revealed granulation tissue on histological examination.

The patient used topical estrogen (estriol 0.5 mg vaginal cream daily for 12 wks) and hyaluronic acid (vaginal cream 5 mg daily for 10 wks), but this failed to reduce ulcer size or vaginal bleeding. She underwent three laser sessions to the decubitus ulcer of the vaginal vault at 30-day intervals using a fractional microablative CO2 Pixel laser system (Alma Lasers, Caesarea, Israel) equipped with a Pixel 9x9 probe suitable for the treatment of the vulva, which pixelates the beam to 81 pixels delivering the energy in a square pattern with an 11 x 11 mm spot size. The settings consisted of an energy of 75 mJ/pixel, 20 W power, and a pulse time of 300 ms/pulse. No side effects were reported during or after laser therapy. At a 2-month check-up after the final laser session, a significant improvement was noted in the decubitus ulcer with wound healing of approximately 95% (Fig. 2). Written consent was previously obtained.

DISCUSSION

Women with POP may elect observation, pelvic floor muscle training, pessary use, or surgery.7 The primary goal of any treatment is to improve symptoms and, for conservative management, to minimize prolapse progression. Worldwide, an estimated 300,000 women undergo surgery as treatment for POP each year.8 Nonetheless, recurrence rates of symptomatic prolapse after reconstructive surgery vary from 6% to 30%.9 Pessary use is an option for some women and may be effective for those who wish to avoid surgery. It may also be useful in women who are not surgical candidates because of underlying comorbidities that make surgery too difficult or risky.10 The most common complications of pessary use are vaginal discharge, irritation, ulceration, bleeding, pain, and odor. Different vaginal preparations and lubricants have been described for decubitus ulceration related to advanced POP, including normal saline, povidone-iodine, estrogens, and hyaluronic acid.11,12 In addition, a retrospective cohort study found that the commonly used vaginal estrogen therapy was not actually protective against vaginal ulcerations or bleeding.13

This was particularly the case for our patient in which a wide decubitus ulcer was unresponsive to many topical treatments, making a new surgery risky.

Most decubitus ulcers associated with advanced POP are full-thickness ulcerations with breakdown extending through the dermis and exposing subcutaneous tissue.3 Fractional micro-ablative CO2 laser treatment has proved to be safe for remodeling tissue in many body regions, including the skin of the face, neck, and chest, and can produce new collagen, elastic fibers, and increased numbers of fibroblast cells.14 Furthermore, the use of vaginal fractional laser therapy is one of the new nonhormone therapeutic approaches that has proved to be effective for the management of postmenopausal women with clinical signs and symptoms of genitourinary syndrome of menopause.5 For these reasons, we decided to apply the fractional laser in our patient. Literature on managing advanced POP with associated decubitus ulcers is sparse.

Another strength of our observation was the use of "pixelated" technology, primarily developed for dermatologic indications where an array of laser spots is "stamped" onto the skin through a micro-lens array, or holographic beam splitter, creating micro-ablation dots in the surface layer, leaving surrounding tissue intact. The wavelength delivered by all CO2 laser devices is the same, and the diameter of each fractionated microbeam (termed a micro-spot, or "pixel") can be adjusted within a certain micron range, depending upon the power density of the beams. In principle, the exposed area is covered by evenly distributed thermal energy, but the effects on tissue are different. This mode of operation delivers "low power - long pulse," as compared to some other energy-based delivery modes of "high power - short pulse," resulting in tissue healing attributed to the superficial micro-ablation, and tissue stimulation linked to the shape of thermal distribution.15 The healing process needed in case of decubitus ulcer may benefit from the dual effect of micro-ablation and thermal deposition by the technology used in this case.

CONCLUSIONS

In conclusion, this case study demonstrates that fractional Pixel CO2 laser treatment is a viable option for managing decubitus ulcers before definitive surgery in postmenopausal women with advanced POP. Although not conclusive because we reported a single case report, the paper highlights the need to further elucidate the role of fractional laser in the treatment of this difficult condition.

FIGURES

FIG. 1. Patient's wide decubitus ulcer over a vaginal vault prolapse.

FIG. 2. Treatment outcome after three sessions laser in patient with previous wide decubitus ulcer over a vaginal vault prolapse.

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