

**Case Series**

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**Treating peritoneal dialysis catheter exit-site granulomas with plasma radiofrequency****Gennaro Argentino<sup>1\*</sup>; Maria Elena Liberti<sup>1</sup>; Mario Iorio<sup>1</sup>; Alessandra Antonia Mele<sup>1</sup>; Andrea Camocardi<sup>1</sup>; Andrea Pota<sup>1</sup>; Maria Luisa Sirico<sup>1</sup>; Enrica Emanuela Cascone<sup>1</sup>; Luigi Russo<sup>1</sup>; Raffaele Genualdo<sup>1</sup>; Giuseppe Surfaro<sup>2</sup>; Lucia Di Micco<sup>1</sup>**<sup>1</sup>Nephrology and Dialysis Unit, Hospital of the Sea, Naples, Italy.<sup>2</sup>General Surgery Unit, Hospital of the Sea, Naples, Italy.**\*Corresponding Author: Gennaro Argentino**Nephrology and Dialysis Unit, Hospital of the Sea,  
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**Abstract**

**Introduction:** Silver nitrate cauterization is the conventional treatment for peritoneal dialysis catheter exit-site granulomas. Plasma-Ion Pen is a new technique that takes advantage of Plasma radiofrequency ablation and consists of generating plasma energy through the production of ionized energy. These devices are currently very popular on the market at a very low price. At our Nephrology center, we investigated the potential of utilizing the Plasma-Ion Pen as a viable alternative for treating exit-site granulomas on the peritoneal catheter.

**Materials and methods:** Following the recurrence of previously treated granulomas with silver nitrate cauterization, five patients were selected to undergo therapy utilizing the Plasma-Ion Pen.

**Results:** All five of our patients achieved a 100% healing rate when treated with the Plasma-Ion Pen. The average time for granuloma recurrence was significantly extended with the utilization of the Plasma-Ion Pen (62.3 days in one patient) compared to silver nitrate treatment (32.1 days in two patients).

**Keywords:** Peritoneal dialysis; Catheter exit-site granulomas; Plasma-Ion Pen; Silver nitrate cauterization.

**Introduction**

Traditionally, peritoneal dialysis catheter exit-site granulomas have been treated with silver nitrate cauterization [1,2]. However, this procedure, typically administered by nurses, frequently leads to patient discomfort and chemical burns [2,3]. The Plasma-Ion Pen represents an innovative approach to harnessing Plasma radiofrequency ablation. It operates by producing ionized energy to generate plasma energy. This technique achieves uniform and controlled thermal tissue heating using a radiofrequency device, leading to tissue sublimation [4,5]. At our Nephrology center, we investigated the potential of the Plasma-Ion Pen as an alternative treatment option for the peritoneal.

**Objective**

To evaluate the efficacy of the Plasma-Ion Pen in managing peritoneal catheter exit-site granulomas.

**Materials and methods**

**Study design:** Case reports

**Participants:** Five patients diagnosed with exit-site granulomas were selected to undergo therapy utilizing the Plasma-Ion Pen.

**Measurements:** The progress of five patients was tracked with weekly visits following the initial session, spanning six

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weeks. This monitoring period aimed to assess the duration of granuloma subsidence and any potential adverse effects. Pain levels and treatment satisfaction were gauged using a numerical rating scale and a customized questionnaire, respectively. Plasma originates from the ionization of neutral gasses found in the atmosphere. The Plasma-Ion technique harnesses plasma energy generated by ionizing atmospheric gas between the device and the skin. It comprises a handpiece with a sterile tip and a wrist generator [5]. Operating without direct contact between the tip of the device and the skin surface, the ensuing plasma spark sublimates the superficial layers. This leads to an instantaneous transfer of stored thermal energy to the skin surface, facilitating controlled and uniform heating. Plasma radiofrequency energy initiates microplasma sparks in the air between the device tip and the skin surface. This gentle epidermal sublimation preserves a layer of intact and desiccated epidermis, preventing harm to the deeper skin layers [4,5]. Moreover, it initiates a thermal effect that fosters skin regeneration and extensive remodeling of dermal fibroblasts, facilitating new collagen synthesis and deposition. Additionally, it stimulates rapid re-epithelialization [6].

### Results

All five patients treated with the Plasma-Ion Pen achieved a 100% healing rate (Figures 1 and 2). The average time for granu-

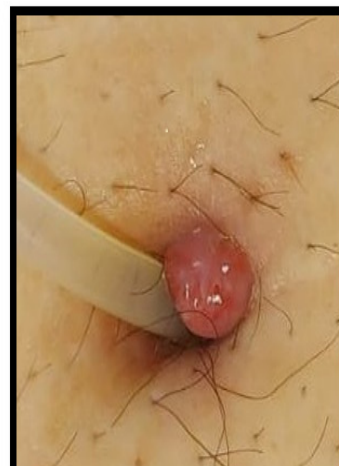
loma recurrence was significantly prolonged with the Plasma-Ion Pen (62.3 days in one patient) compared to silver nitrate treatment (32.1 days in two patients). The five patients experienced no significant adverse effects and reported a lower mean pain score compared to those undergoing silver nitrate therapy. The satisfaction score surpassed that of the previous therapy with silver nitrate.

### Discussion

Utilizing the Plasma-Ion Pen for the removal of peritoneal dialysis catheter exit-site granulomas yielded comparable success rates, reduced pain levels, and fewer adverse effects compared to silver nitrate treatment [7]. A key aspect of this technique is its ability to customize treatment by precisely targeting and reducing the thickened hypertrophic area of the scar, as well as addressing the edges of the surrounding atrophic scar area. The benefits encompass the absence of absolute contraindications, minimal intraoperative discomfort, swift treatment duration, rapid formation of the postoperative protective layer, and expedited healing of the wound surface. Ultimately, the cost effectiveness of the equipment provides a mutual advantage for both the operator and the patient (Figure 3). However, due to the limited number of observed patients, further research is necessary to assess its broader applicability.



**Figure 1:** Patients with total regression of signs of inflammation.



**Figure 2:** Patients with total regression of signs of inflammation.



**Figure 3:** Plasma-Ion Pen.

**Conflicts of interest:** The authors have disclosed no conflicts of interest related to the publication of this paper.

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