

## CASE REPORT

# Pulse dye laser treatment for plantar warts

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**SUMMARY.** Warts are a common problem faced by podiatrists, dermatologists and GPs in the UK and they account for a large proportion of referrals to dermatology and podiatry departments. Plantar warts can be a particular source of pain and distress as they may interfere with normal activity. The use of the pulsed dye laser (PDL) for this condition has been documented in the USA. We report on two cases successfully treated in our department with favourable results, using the Candela SPTL-1 pulsed dye laser.

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### CASE 1

A 52-year-old woman presented to the dermatology department with a painful plantar wart on the medial edge of her left heel. The lesion had been present for over a year and measured 6 mm in diameter. Lengthy, painful applications of liquid nitrogen had had no effect on the lesion. Moreover, owing to the position of the lesion, it became increasingly difficult for the patient to walk and stand for any period of time.

It was decided to treat the lesion with a course of pulsed dye laser (PDL) therapy. A recent paper from the USA<sup>1</sup> had documented the successful use of the 585 nm PDL in the treatment of plantar warts. Over a period of 6 weeks, at fortnightly intervals, the patient received three laser treatments. Each consisted of 7 pulses applied to the lesion and its periphery at an output of 8.5 joules/cm<sup>2</sup>, following debridement of the overlying hyperkeratosis.

Seven weeks after the commencement of treatment, the lesion was no longer apparent and the patient was pain free. Lateral pressure to the former lesion site elicited no pain. At 12 months follow-up the wart remained resolved.

### CASE 2

A 19-year-old college student was referred to the department with a 2-year history of painful plantar warts affecting the third and fourth digits of her left foot. Once again, treatment with liquid nitrogen had had no effect and owing to their location, the warts were causing constant pain on weightbearing.

One treatment of 4 pulses to the lesions of 10 joules/cm<sup>2</sup> was sufficient to cause resolution seen at follow-up 3 weeks later. At 8 months follow-up the warts remained resolved.

### DISCUSSION

Warts, caused by the human papilloma virus, are a common infection of the epidermis. Three main types have been identified infecting the plantar surface – HPV types 1, 2 and 4. Infection commonly occurs when the epidermis has been weakened, i.e. by abrasion or maceration. With plantar warts, this is commonly on weight bearing areas such as the metatarsal heads, the digits and heels. The incubation period has been estimated to range from a few weeks to more than a year.

Plantar warts are a particular cause of pain owing to their location over weightbearing areas. The vast range of suggested treatments available perhaps indicates the differing success rates obtained when trying to eradicate such lesions.

Most techniques rely on the destruction of wart-infected tissue, and have common disadvantages. These include pain, blistering, bleeding, ulceration and scarring. The carbon dioxide laser is a current treatment for stubborn warts and is known to cause such effects.

By comparison, the main advantages of the PDL are:

1. Normally, there is no need for anaesthesia.
2. Neither necrosis or open lesion is normally produced with this treatment, reducing the chance of ulceration or secondary infection.
3. Scarring is a rare feature with this treatment.
4. Treatment is quick with little need for specialist postoperative treatment.

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## PREVIOUS RESEARCH

Formal studies into the use of the PDL in plantar wart treatment are sparse and in those reviewed by the author, different success rates are reported. Borovoy et al<sup>2</sup> carried out 100 treatments on 46 patients and reported a success rate of 76.1%. McDaniels and workers<sup>3</sup> report a 93% success rate after an average of 2–3 treatments. Tan et al<sup>1</sup> report a success rate of 50% in six patients. In comparison to carbon dioxide laser, these results fair well, especially when considering the reduced incidence of side-effects. It is interesting to note that most studies undertaken into the value of the pulsed dye laser have only been carried out on recalcitrant warts.

## ACTION OF THE PDL

To date, the PDL has proven to be most effective in the treatment of cutaneous vascular disorders such as haemangiomas, port wine stains and telangiectasia. At wavelengths of around 577–585 nm the laser light energy is specifically absorbed by oxyhaemoglobin in small-diameter, surface blood vessels. As the tissue molecules increase in vibrational energy, heat is produced. The effect of this laser energy can range from thrombosis to total necrosis of affected vessels<sup>4</sup> with little damage to surrounding tissues. This effect for this reason has been labelled 'selective photothermolysis'.<sup>5</sup>

The exact amount of damage to surrounding tissues is still an issue for debate. Hohenleutner et al<sup>6</sup> observed ballooning and elongation of local keratinocytes. Tan et al<sup>1</sup> document similar changes with necrosis of local keratinocytes. Damage to the dermis with this therapy is minimal, hence scarring is a rare feature with the PDL.

## EFFECTS OF THE PDL ON WART TISSUE

The effects of the PDL on warts are not so clear and to date, most authors only hypothesize as to its mode of action. One possible mechanism could be that destruction of the nutrient vessels serving the wart-infected tissue may lead to the warts resolution.<sup>1,2</sup> It is interesting to note that vascular microthrombi are a common feature in regressing warts, regardless of treatment modality.

Another theory is that local tissue heating arising from the laser pulse is sufficient to destroy the heat-sensitive wart virus.<sup>1</sup> The role of cell mediated immunity in the process requires investigation. It is possible that laser induced keratinocyte damage may lead to exposure of virus particles to the immune system, promoting immunity.

In conclusion, the use of the pulsed dye laser in treatment of warts from early results appears encouraging, with few side-effects. More research is required to understand its precise mode of action on wart tissue and to see if variation in treatment regimes can yield improved results.

## REFERENCES

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