ORIGINAL ARTICLE

Study of the Effect of PDL Treatment of Recalcitrant Plantar Warts

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ABSTRACT

Forty patients (20 males and 20 females) with recalcitrant plantar warts were divided into two equal groups. The first group received Pulsed dye laser (PDL) treatment and the second group received PDL machine coolant as a placebo. No statistically significant difference was found between both the sexes, when the response to PDL treatment was considered. The PDL group patients showed 45% clearance and 55% partial clearance. The results were found statistically significant compared to the coolant group. No significant side effects were noted in our study. The PDL treatment was found to be safe, tolerable, convenient and effective treatment. Considering the pain produced by plantar warts, the discomfort caused by treatments routinely used and work days lost in dermatology outpatients visits, we recommend PDL treatment as the first line of treatment in recalcitrant plantar warts.

KEY WORDS: Pulsed dye laser (PDL), plantar warts.

INTRODUCTION

Warts are benign epithelial proliferations induced by human papilloma virus (HPV). It is a common problem affecting approximately 10% of the population.[1] Some HPV types tend to cause warts at certain anatomical sites. HPV type 1 and 2 are frequently associated with plantar warts and to a less extent type 4 and 63.[2] However, any type of HPV can produce warts at any site. Plantar warts in particular are painful and may interfere with an individual's ability to walk.

Many different modalities of therapy have been used in the treatment of warts, such as keratolytic agents, cryotherapy, surgical excision, electrocautry, carbon dioxide laser removal and pulse dye laser (PDL) among others.[3] None of the treatments used has direct antiviral effect.

PDL is one of the relatively new methods used in the treatment of warts. Although the mechanism of action of this method is not fully known, it is thought that PDL blocks the blood supply to warts by producing selective photothermolysis, causes destruction in the cells that reproduce, and stimulates an immune response.[4-6]

The aim of our study was to evaluate the efficacy of PDL treatment of recalcitrant plantar warts.

PATIENTS AND METHOD

Forty patients (20 males and 20 females) with recalcitrant plantar warts were enrolled in the study over one year period. Inclusion criteria included age 18 years and above, suffering from plantar warts unresponsive to one or more modality of treatment other than PDL for more than two months, and no history of constitutional or iatrogenic immunosuppression. All patients gave informed consent. Patients (males and females) were divided into two groups using a table of random numbers. The first group (10 males and 10 females) received three sessions

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of PDL with the dynamic cooling device (DCD) off at two weeks interval. The second group (10 males and 10 females) received three sessions of a placebo in the form of PDL machine coolant at the same interval.

At the first visit, all lesions were photographed and individual lesions measured and followed up. Before treatment sessions in either group, lidocaine/prilocaine 5% cream (EMLA) was applied with occlusion followed by paring of the warts using curette number 4 or 7 to remove hyperkertotic skin or debris.

All patients and staff wore protective eyewear and laser masks. A smoke evacuator was used during sessions as a precaution against airborne viral particles.

PDL sessions consisted of treatment with the flash-lamp pumped PDL (595 nm, Candela Corp.) with either 5 or 7 mm spot size, at fluences between 12 and 14 J/cm2, and pulse duration 1.5 ms. Stacking technique was used with an average of 4 shots per lesion per session. Treatment included a 2 mm border of surrounding clinically normal appearing skin. For the control group, DCD of PDL machine was used alone.

Evaluation was done one month after the third treatment session. Estimation of efficacy after three treatment sessions was recommended in previous reports.[7,8] The efficacy of the treatment was graded as follows: complete response (complete clearance), partial response (reduction in size and number) and no response (no change in size and number).

Any side effect or difficulty related to treatment was noted. Intraoperative and postoperative pain was graded subjectively by patients as minimal, mild, moderate or severe.

STATISTICAL METHODOLOGY

Data was collected, coded and then entered into an IBM compatible computer, using the SPSS version 17 for Windows. Entered data were checked for accuracy then for normality, using Kolmogorov-Smirnov & Shapiro-Wilk tests. Qualitative variables were expressed as number and percentage. While, the quantitative variables were expressed as median, mean (X), and standard deviation (S).

The arithmetic mean and the median were used as measures of central tendency, while the standard deviation was used as a measure of dispersion.

Independent sample of Mann-Whitney's U-test (or Z-test) was used as a nonparametric test of significance for comparison between two sample medians. A 5% level was chosen as level of significance.

RESULTS

The group of patients who received PDL consisted of 10 males and 10 females aged 18 years and above suffering from recalcitrant plantar warts. None of them had history of constitutional or iatrogenic immunosuppression. The minimum age in male patients receiving PDL was 18 years and maximum age was 54 year, with a mean of 32.6+12.989 years. The minimum age in female patients receiving PDL was 20 years and maximum age was 75 years, with a mean of 43.5+18.603 years. Four out of the 10 male patients (40%) showed complete clearance and 6 (60%) showed partial clearance. Five out of the female patients (50%) showed complete clearance and 5 (50%) showed partial clearance. There was no statistically significant difference between both sexes, when the response to treatment was considered (p=0.739).

The control group receiving PDL machine coolant consisted of 10 males and 10 females aged 18 years and above suffering from recalcitrant warts. None of them had history of constitutional or iatrogenic immunosuppression. The minimum age in male patients was 28 years and maximum age was 60 years with a mean of 43.9+14.441 years. The minimum age in female patients was 19 years and maximum age was 50 years, with a mean of 30.4+12.394 years. Three out of the 10 male patients (30%) showed complete clearance, 2 (20%) showed partial clearance and 5 (50%) showed no response. None of the female patients showed complete clearance, 1 (10%) showed partial clearance and 9 (90%) showed no response. Again, there was no statistically significant difference between both sexes when the response to treatment was considered (p=0.105).

In the PDL group, the 40% complete clearance in male patients did not differ significantly from 50% complete clearance in female patients at the 5% level. Accordingly, the results in whole PDL group (males and females) and the control group (males and females) were considered.

Table 1 shows the response in both PDL group and control group

Response	PDL	Coolant
Complete Response	9 (45%)	3 (15%)
Partial Response	11 (55%)	3 (15%)
No response	0 (0%)	14 (70%)
Total	20 (100%)	20 (100%)

The calculated Mann-Whitney's Z value was found to be 3.993 denoting significance at the 5% level. This means that there was an association between PDL treatment and the outcome.

Although EMLA cream was used, our patients experienced pain. Two (10%) of the PDL group had minimal pain, 8(40%) had mild pain, 8(40%) had moderate pain and 2(10%) had severe pain. All patients who had intraoperative pain, felt it with the 4th shot of PDL. Hemorrhage and crusts were usually removed within two weeks. Post-treatment discomfort was tolerable and of evanescent nature.

Fig. 1 Multiple bilateral plantar warts (a) before treatment (b) after treatment.

DISCUSSION

Although viral warts constitute a common dermatologic disease, treatment of warts, particularly plantar warts can be difficult. The pain associated with plantar warts and plantar warts treatments based on physical destruction of virus-infected cells are troublesome to patients affecting their walk and daily activity.

PDL is one of the modalities used in treating warts. The mechanism of action of PDL in the

treatment of warts is not fully understood. Dilated vessels in the papillary dermis are characteristic feature of warts.[9] Light microscopic evaluation of treated areas immediately after treatment and at 1, 6, and 13 days after treatment show agglutinated erythrocytes in the papillary vessels with subsequent thrombosis and endothelial and keratinocyte necrosis.[10] This destruction may obliterate the nutrient supply to the wart or destroy the rapidly dividing epidermal cells that contain human papilloma virus. In addition, thermal injury of the heat sensitive HPV may also contribute to the mode of action.[11] It appears that an intact immune system is also essential as immunocompromised patients with viral warts respond poorly to PDL.[12] It is possible that the local dermal vascular destruction of the wart stimulates cell mediated immune responses known to be important for eradication of viral warts.[13]

Using PDL, Robson et al achieved complete clearance in 64% and partial clearance in 29% of cases of plantar warts. They also reported that plantar warts are less responsive to treatment than body warts. Robson et al. treated both simple and recalcitrant warts on different anatomical sites, body and plantar.[14] Kopera, reported less response of plantar warts to treatment compared to warts in other anatomical sites.[15] Kauvar et al and Jain et al reported success rate of 84% and 70.1% respectively.[12,16] Tan et al reported eradication of 11 out of 12 recalcitrant plantar warts treated.[10] In our study, we achieved 45% complete clearance and 55% partial clearance. All our patients were responsive to PDL treatment. Such success rates in recalcitrant plantar warts are quite acceptable. On the other hand, Huilgol et al reported complete failure in treating recalcitrant plantar warts.[17] The difference in success rates could be attributed to differences in techniques used in treatment. The fluence, pulse duration and number of shots used in addition to the interval between sessions could have crucial effect on the result of PDL treatment. No significant side effects were noted in our study. Most of the patients experienced minimal to mild pain during treatment, particularly with the 4th shot. This could be attributed to the high fluence used. None of them dropped treatment because of it. All our patients were able to resume their daily activities immediately after PDL treatments.

The cost of PDL treatment has been considered as one of the disadvantages of this method.[7] The cost would vary from country to country, and even from hospital to hospital according to local regulations and health plans. However, considering the smaller number of treatments needed for complete clearance, as compared to other modalities, the cost would be acceptable.

Our study showed that PDL is a safe, tolerable, convenient and effective treatment. Considering the pain, the recalcitrant plantar warts patients suffer, the discomfort resulting from treatment methods routinely used and work days lost in dermatology outpatients visits, we would recommend it as a first line treatment for recalcitrant plantar warts. Larger controlled studies are needed to standardize the technique used in the treatment to achieve rapid and uniform results.

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