

# Soft-Tissue Bunion Repair with a CO<sub>2</sub> Surgical Laser

## Abstract

This article is designed to provide an introductory approach to surgical dissection with a carbon dioxide laser. The description of the operative procedure offers the podiatric surgeon guidance in selecting the appropriate laser and power density for designing his/her own approach.

## Introduction

In articles previously written in the podiatric literature, much attention has been given to dermatological conditions such as verrucae, fungal nails, porokeratotic lesions, and ingrown nails. The benefits of laser surgery in the aforementioned areas is fast becoming common knowledge. This paper proposes to take these advantages one step further.

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*"The main concern for both patients and physicians is eye damage from a laser."*

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For the benefit of our patients and of our profession, we need to maintain a vigilant eye; we must remain open to better ways or techniques which could advance our capabilities. This new approach to surgical incisions and dissection may be beneficial in one's daily practice.

## Equipment

Not all lasers are capable of producing the power density needed to make an efficient incision. In my opinion, I feel a power density of approximately 250,000-

800,000 watts per cm<sup>2</sup> is needed. Unlike dermatological lesions, ablation of tissue needs to be transferred to a more powerful form of vaporization. By increasing the power density, we can create a more intense beam, thereby creating a quicker, cleaner vaporization of the tissue. With a high power density there will be less trauma to the surrounding cells from the heat, resulting in quicker healing.

## Eye Care

The main concern for both patients and physicians is eye damage from a laser. When performing incisions and dissections, the laser's beam can reflect off of retractors and pick-ups. For this reason, protective eye wear is necessary. An alternative to eye protection would be to use specifically designed instruments which will not reflect the laser's beam.

## Operative Procedure

*Procedure:* Radical bunionectomy.

*Anesthesia:* Local 2% Xylocaine<sup>®</sup> R<sup>1</sup> with epinephrine, and I.V. sedation.

The patient is placed in a mildly sedated condition, and local anesthesia is performed. The foot is surgically prepped and draped in the typical podiatric sterile fashion. Attention is then directed to the dorsal aspect of the 1st metatarsophalangeal joint, where a six-centimeter linear longitudinal incision is placed with a CO<sub>2</sub> surgical laser at approximately 250,000 watts per cm<sup>2</sup>. The incision is carried through the skin to the subcutaneous tissue. The skin tissue is subsequently lifted, and all bleeders are ligated with the laser in a defocused mode at 250,000 watts per cm<sup>2</sup>. Next, all neurovascular structures are retracted aside. The laser is used in a focused beam to make an incision into the capsule in a linear longitudinal fashion. Attention is then directed to the medial capsule where a transverse incision is made with the CO<sub>2</sub> laser forming a T-shaped capsular incision. This is done in order to decrease periosteal bleeding in the capsular incision. At this point, a #15

blade is used to release the capsule from its osseous attachments, and the metatarsal head is delivered into clear view. The medial eminence is removed with a high-speed surgical bone saw. All osteophytic edges and projections are smoothed with a high-speed surgical bone burr. After that, the surgical site is copiously flushed with sterile saline. (At this time, bleeding of the bone may be noticed. This is because no tourniquet is being used. The bleeding will decrease as the procedure progresses.)

The extensor brevis tendon is identified and isolated. Using the laser in a focused beam at 250,000 watts per cm<sup>2</sup>, the tendon is severed. Attention is then directed to the lateral aspect of the 1st metatarsophalangeal joint where the adductor tendon is identified and severed with the CO<sub>2</sub> laser, again in a focused mode at 250,000 watts per cm<sup>2</sup>. At this point, the laser is used to perform a lateral capsulotomy. Redirecting attention to the medial capsule, a capsulorrhaphy is then performed with the laser in a focused mode.

Coaptation of the capsule is performed with 2-0 Dexon<sup>®</sup>. R<sup>2</sup> Subcutaneous tissue coaptation is performed with 3-0 Dexon. Skin closure is accomplished with 6-0 nylon in running-lock fashion with Steri-Strips<sup>®</sup>. R<sup>3</sup> The surgical site is then infiltrated with 0.5% Marcaine<sup>®</sup> R<sup>4</sup> with epinephrine, and a steroid.

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*"I have found a significant reduction in patients' use of narcotic analgesics after this procedure."*

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## Dressing

A dry, sterile compression bandage is applied with Adaptic<sup>®</sup>, R<sup>5</sup> povidone-iodine

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ointment, gauze, and Kling®.<sup>R6</sup> An ace wrap is then applied to the dressing, and a postoperative shoe is worn.

#### Postoperative Instructions

After this procedure, the patient is instructed to apply an ice pack and to elevate the operated extremity, as well as to maintain the surgical dressing until the next visit. It is important that the patient stays off the foot as much as possible for the first twenty-four hours; after this period, ambulation with the postoperative shoe is done to the degree that the patient feels comfortable.

#### Medications

Patients are given narcotic analgesics to use for pain. I have found a significant reduction in patients' use of narcotic analgesics after this procedure.

#### Advantages of Laser Usage

The laser offers the following advantages over some conventional techniques:

1. It seals and cauterizes vessels during

the vaporization process, thus allowing for an almost bloodless field. There is little or no need for a tourniquet.

2. It eliminates the use of ankle or thigh tourniquets which a) do not allow for antibiotic perfusion, b) cause tissue hypoxia, and c) make it difficult to identify small severed vessels (increasing postoperative inflammation and pain).

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#### Discussion

There is current debate about the use of the CO<sub>2</sub> laser in performing bunion or other incisional surgery. The intent of this

paper is to clear the air as to the applications of the CO<sub>2</sub> laser for these procedures.

The CO<sub>2</sub> laser is not advocated for osseous work in routine bunion repair—only in the soft-tissue repair. The operative-report style is presented so that the podiatric surgeon can have a clear understanding of the laser's applications in a step-by-step progression for bunion surgery.

This paper addresses the basic steps used by this author, and is not intended to be a cookbook approach to soft-tissue bunion repair with a laser.

#### Manufacturers' Index

<sup>R1</sup>Xylocaine® with epinephrine, Astra Pharmaceutical Products, Inc., Westboro, MA 01581-4428.

<sup>R2</sup>Dexon®, Davis & Geck, Inc., Manati, P.R., U.S.A.

<sup>R3</sup>Steri-Strips®, Surgical Products Division of 3M, St. Paul, MN 55144.

<sup>R4</sup>Marcaine® with epinephrine, Winthrop-Breon Laboratories, New York, NY 10016.

<sup>R5</sup>Adaptic®, Johnson & Johnson, New Brunswick, NJ 08903.

<sup>R6</sup>Kling®, Johnson & Johnson, New Brunswick, NJ 08903.

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