

Carbon Dioxide Assisted Subcision in the Treatment of Adherent Localized Scars

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Abstract: Modified subcision assisted with Carbon Dioxide insufflation is described in 2 patients; one with post acne scar and another with adhesion following liposuction. Both subjects have satisfactory results after 3 fortnightly sessions. The Carbon Dioxide flow controlled by the flow rate and procedurist's maneuvering adjusted to the size and position of the scars help to separate the underlying fibrotic bands allowing the reach beyond the length of the subcising device; in this case being a 30G ½ needle. The results and recovery is being compared with traditional subcision and possible benefits of Carbon Dioxide assisted subcision are discussed.

Keywords: Carbon Dioxide, Scar, Subcision

1. Introduction

Scars can occur from tissue injury to the skin, as a result of acne, infection, injury or surgery. Subcision remains an important aspect of treatment to improve the appearance of rolling scars [1].

The technique as described by Orentreich [2] is a minor surgical procedure commonly prescribed for treating depressed scars and adhesions. A hypodermic needle is inserted through the skin surface and its sharp edges manoeuvred under the affected area to make subcuticular cuts in a fan like manner. The principle of this incisionless procedure is to break down the fibrotic tissue, which tether the scar to the underlying subcutaneous tissue. The depression is lifted by the releasing action of the procedure, a small hematoma is intentionally created to act as a filler to enhance wound healing.

However, with traditional subcision, there is significant downtime with bruising and persistent erythema and sometimes, over correction [1].

Carboxytherapy has been used to treat localised adiposity [3], post liposuction irregularity [4], chronic wounds [5], skin laxity, cellulite [6-7], striae [8] dark under circles [9], and scars [10]. CO₂ therapy is administered subcutaneously for lipolysis [3] or intradermally using a programmable CO₂

therapy apparatus (Carbomed®, Carbossi Italy) and disposable 32G needles. The gas is allowed to be infused over the whole treated area with the endpoint being successful release of the adherent fibrotic tissue visualised by the medical staff. It is believed that its mechanism of action is twofold. First, the mechanical injection of the CO₂ causes interruption of surrounding connective or scar tissue through direct mechanical destruction. Secondly, CO₂ induces vasodilatation and stimulates an inflammatory response that increases collagen growth and tissue remodelling thus improving the skin texture [5]. Moreover, with the flow of the CO₂, subcision beyond the length of the needle is possible and this can be applied to larger adherent scars. Hence, carboxytherapy can be an effective adjuvant treatment in subcision of localised adherent scars.

2. Method

Case1:

A 27- year old woman presented with a large 1cm deep scar from a solitary pimple which had been treated with intralesional steroid injection by another practitioner 2 months previously. A modified technique with infusion of Carbon Dioxide gas was carried out with informed consent.

The area was prepared with application of topical anesthetic

EMLA 5% (Eutectic mixture of local anaesthetics: Lidocaine 25mg, Prilocaine 25mg/ gram).

The scar and surrounding area was thoroughly cleansed with Chlorhexidine 0.05% (Baxter) and CO₂ was infused intradermally into the scar using the Carbomed Programmable Automatic Carbon Dioxide Therapy apparatus (Carbossi, Italy) and 30G ½, 0.3x13 microlance needles. The infusion velocity administered was 50 cc/min and the total quantity of CO₂ infused was less than 10cc. Subcuticular fan like sweeping cuts was made under the scar. The procedurist's finger from the non-injecting hand is placed just beyond the margin of the scar to control the flow of the gas. The whole procedure took less than 15 seconds.

A total of 3 sessions of CO₂ assisted subcision of the scar was performed at 2 weekly interval.

Case 2:

A 30-year old woman required treatment for post-liposuction irregularity and scarring following ultrasound-assisted liposuction of her abdomen 3weeks before.

The injection entry area was thoroughly cleansed with Isopropyl Alcohol 70% (Webcol) and CO₂ was infused intradermally from the lower outer aspect of the area of tethering using the Carbomed Programmable Automatic Carbon Dioxide Therapy apparatus (Carbossi, Italy) and 30G ½, 0.3x13 microlance needles. The infusion velocity administered was 100 cc/min and the total quantity of CO₂ infused was between 300-500cc. By controlling the flow of the gas with the non-injecting hand, the gas was diverted to right under the large area of scarring from just one injection entry point.

A total of 3 sessions of CO₂ assisted subcision over the scar was performed at 2 weekly interval. The appearance of her preexisting striae has also shown improvement from the same treatment.

3. Results

Case1:

There was some immediate swelling with significantly less hematoma compared to traditional subcision. Scar tissue is released with less subcuticular cuts compared to traditional subcision as the CO₂ gas has a better and more even reach compared to traditional subcision with needle alone.

Two weeks later (Figure 2), there was significant scar release and no noticeable erythema as there had been minimal bruising compared with the traditional technique. Figures 5-7 illustrate typical results on another 37 year old female patient with a similar lesion treated conventionally. The improvement after the 3rd session (Figure 4) provided satisfactory results for the patient and negated the need for further laser refinement of the affected area.

[Figures 1 - 4 and 5 - 7 near here]

Case 2:

Two weeks after the 3rd session, (Figure 9), there was significant adhesion release. Although there is still irregularity from the liposuction, patient is satisfied with the results and

did not need further treatments.

[Figures 8 and 9 near here]

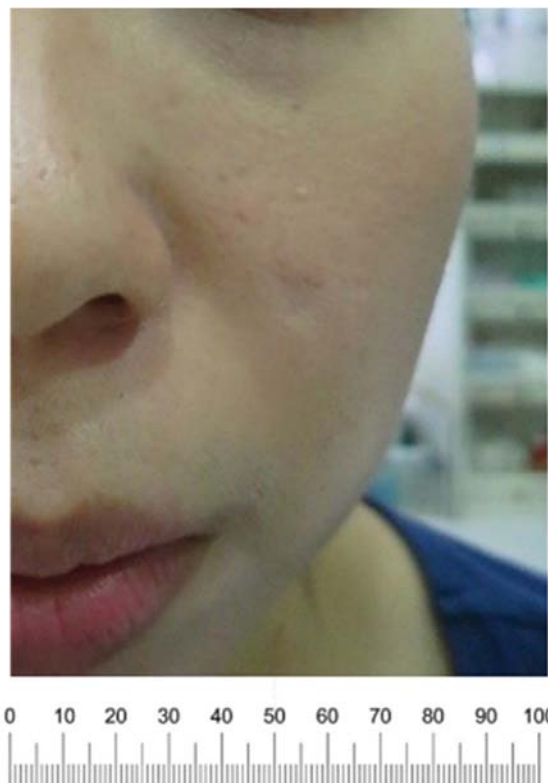


Figure 1. 2 months old scar. Post acne.



Figure 2. 2 weeks after 1st CO₂ assisted subcision.



Figure 3. 2 weeks after 2nd CO₂ assisted subcision.



Figure 4. 2 weeks after 3rd CO₂ assisted subcision.

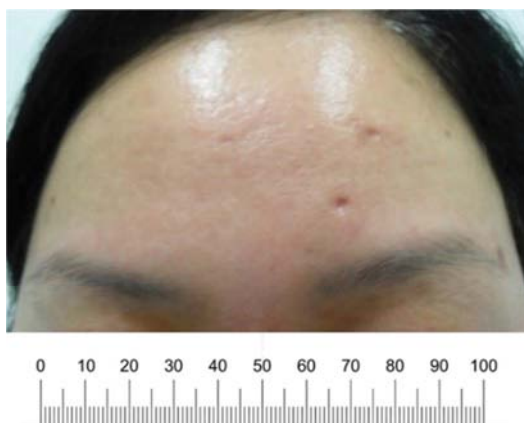


Figure 5. Before traditional subcision.



Figure 6. 3 weeks after 1st traditional subcision.



Figure 7. 6 months after 2nd traditional subcision.



Figure 8. 3 weeks after liposuction.



Figure 9. 2 weeks after 3rd CO₂ assisted subcision.

4. Discussion

Carbon Dioxide is a non-toxic gas that is widely used in laproscopic surgery and the treatment is affordable. Localized swelling due to CO₂ usually resolves within 30 minutes. This duration is similar to that reported by Ozan Balik et al who reported localized swelling lasting up to 48h when air is substituted in an experiment involving Wistar rats [11].

Compared to the traditional subcision technique, possible advantages include reduced downtime from bruising and treatment beyond the length of the needle. With reduced bruising from CO₂ assisted subcision, less initial nodularity accompanying traditional subcision is also observed [12], thus allowing a shorter timeline leading to patient's satisfaction. Subcision with CO₂ infusion allows for reach beyond the length of the needle is an advantage for larger scars, this is akin to the same principle when Carbon Dioxide therapy is being used for reducing irregularity from liposuction [4] and cellulite [7, 13]. The distension of the tissue caused by the gas triggers tissue repair and regeneration processes with neovascularization and remodeling of the extracellular matrix [7] and this contributes to the final results of the scars being treated [10, 14, 15].

The flow velocity for patient in case 1 was lower at 50cc/min as the scar is small and flow control is needed to prevent over-subcision beyond the margins of the smaller scar. Topical anaesthesia was used as subcision over facial area is usually uncomfortable for patients. A higher flow rate at 100cc/min is used for the patient in case 2 as higher mechanical force is needed to release the tighter and larger adhesion. For CO₂ infusion over body areas, topical anaesthesia is not usually used as discomfort to patients is generally well tolerated. The total volume used is determined by visualization of the scar release during the procedure whilst using the non-injecting hand to minimise flow beyond the affected area. For both cases, repeated sessions were performed at 2 weekly intervals with the endpoint being visible clinical release of the adhesion and patients' satisfaction.

5. Conclusion

Compared to traditional subcision, this Carbon Dioxide assisted technique results in less bruising and post treatment nodularity. The erythema contributed by the vasodilatation effect and crepitus from the Carbon Dioxide gas do not last beyond an hour. Due to the wider reach of the gas, this procedure can be useful for larger areas of post-surgical or post traumatic scarring or irregularity. Further experience is required to document the promise of reduced trauma and shorter recovery time and possibly a better outcome from subcision with Carbon Dioxide induced angiogenesis and collagen remodeling. So far our preliminary results suggest this technique is safe, effective and amenable to training.

Disclosure of Interests

The author does not have any conflicts.

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