CASE REPORT

Use of butane–isobutane refrigerant spray in the management of a mucocoele in a visually impaired child

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SUMMARY

Mucocoeles are commonly observed lesions in children and young adults. Conventional management using a scalpel aims at enucleation, requiring psychological preparation of the parent as well as the child because of inherent fear and apprehension towards surgery. This is still more complex in children with visual impairment. The other management techniques are laser, cryotherapy and micromarsupialisation, management strategies that, being painless and tolerable, reduce the anxiety of the child and are therefore more acceptable. The basic technique of cryotherapy stresses on rapid cooling, gradual thawing and repeated freezing to ensure tissue destruction. We report a case of a 13-year-old boy with visual impairment, presenting with a mucocoele on the lower lip, which was managed using butane–isobutane refrigerant spray, which is otherwise routinely employed for pulp vitality testing. A single, 2 min freeze/thaw cycle was used. The healing was uneventful.

BACKGROUND

A mucocoele is a small, painless cyst-like swelling associated with minor salivary glands. Conventional management is by surgical enucleation using a scalpel. The usual Tell Show Do (TSD) and its modifications cannot practically be applied in children with visual impairment. New and conservative management strategies that are acceptable and reduce the anxiety of the child are suggested. As the child in our case was visually impaired, the apprehension was all the greater for both the child and his parents regarding the conventional procedure. To overcome this, cryosurgery was applied, which is a conservative approach using cold refrigerant spray.¹

CASE PRESENTATION

A 13-year-old boy with visual impairment presented to the Department of Paedodontics and Preventive Dentistry, with a painless, soft and fluctuant 1.5×1 cm oval mass on the lower lip, the surface of which was smooth and without ulcerations (figure 1). The patient was known to have visual impairment with progressive diminishing loss of vision, with visual acuity of 20/90 (Snellen Acuity in feet). Medical history was positive for trauma to the lower lip; based on the history and clinical examination, a preliminary diagnosis of an extravasation type of mucocoele was made.

Conventional procedure was planned, but due to a high grade of apprehension in the patient and his

parents, it was abandoned. Instead, a conservative, pain-free approach—based on cryosurgery, using a cold refrigerant spray—was planned.

Tell Touch Taste and Do approach was used in the initial visits to familiarise the child to the clinical environment to alleviate fear and apprehension.

DIFFERENTIAL DIAGNOSIS

- ▶ Fibroma
- ▶ Haemangioma

TREATMENT

The basic technique of cryotherapy stresses on rapid cooling, gradual thawing and repeated freezing to maximise tissue destruction.² There are two methods that are recognised—a closed system with the use of probes and an open system with the use of a liquid nitrogen spray or cotton tip.³ Cell freezing occurs at -2.2°C and the temperature must fall below -20°C for cell death to occur.⁴ Benign mucosal lesions require a single, 2 min freeze/thaw cycle using a cryoprobe, which helps in achieving satisfactory results according to current protocols. In case of premalignant/malignant lesions, three repetitions of 2 min freeze/thaw cycles is acceptable. For smaller oral lesions, shorter freeze cycles help (20–30 s). The present case was treated based on this concept. Cold sprays such as ethyl chloride, dry ice and other commercial refrigerant sprays have traditionally been used in the diagnosis of pulp status. Butane–isobutane spray (Endo Frost, Roeko, Germany) is one such commercial product used for pulp status testing; it has a temperature of -50°C as described by the manufacturer.

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Figure 1 Preoperative photograph.

Figure 2 During procedure showing refrigerant spray.

After obtaining consent, the child was draped in the regular manner and eye protection was offered. The surface of the mucocoele was thoroughly cleaned with povidone-iodine and a topical anaesthetic was applied. Gauze soaked in warm saline and a high vacuum evacuation was used to limit the area of spread and to protect the surrounding tissues ([figure 2](#)). Butane-isobutane refrigerant spray (Endo Frost, Roeko, Germany) was used. The initial treatment plan was to provide two exposures, one exposure with a single, 2 min freeze/thaw cycle and a second exposure after 1 week, if required. An open technique for application of the spray was used and refrigerant spray was directed onto the lesion from the nozzle tip of the canister, in short bursts. A single, 2 min freeze/thaw cycle resulted in a snowball appearance ([figure 3](#)). The first exposure provided satisfactory results. No intraoperative or immediate postoperative discomfort was observed ([figure 4](#)).

The limitation and drawbacks noticed were the onset of ulceration after 48 h ([figure 5](#)). The ulcerated area requires the maintenance of good oral hygiene. The delayed healing time can cause apprehension in the child and the parent. The control of spread of refrigerant spray from the nozzle tip during the procedure, which was managed by the use of warm gauze pieces around the lesion, was cumbersome. Failure to obtain a sample for biopsy was also a drawback.

OUTCOME AND FOLLOW-UP

The child was prescribed analgesics and antiseptic mouth wash postoperatively, and recalled after 24 h, 3 days, 1 week and 3 weeks, to assess healing. Postoperative healing was satisfactory ([figure 6](#)). In the subsequent visits, the child was educated to

Figure 4 Appearance as the thawing occurs.

adopt better hygiene practices, using demonstration models under magnifiers and audiovisual aids. Review and reinforcement visits were scheduled at 3, 6 and 12 months.

DISCUSSION

One of the most common sites for mucocoeles is the lower lip. The stretched mucosa and tissue cyanosis, coupled with translucent fluid underneath, provide a bluish appearance. Mucocoeles can present as single or multiple lesions and, on rupturing, leave ulcerations, causing mild discomfort; healing is usually uneventful, and may terminate in recurrence.⁵

To prevent undesired recurrences, surgical enucleation must include the pseudo cyst and the minor salivary gland responsible for the mucocoele, which is generally coated by a layer of fibrous mucosa.⁶ Other techniques, such as marsupialisation and simple decompression, usually result in recurrence.

Micromarsupialisation, introduced by Cardoso, requiring a silk suture to be maintained for 10 days, could have been considered as a choice for treatment in this case, but was not, as the suture has a tendency to loosen after 2 or 3 days, requiring repetition of the procedure (Morton and Bartley).⁷

Cryotherapy is considered a painless procedure, due to the immediate blockage of neural transmission in the area. Within 1 min of the freeze/thaw cycle, apparent signs of nerve damage occur. This is attributed to the freezing episode itself, and ischaemic changes resulting in energy deprivation of the neuron. The neuron undergoes devitalisation by freezing, but the axon sheath is considered resistant to freezing and largely remains intact. This allows regeneration of the neuron in a week's time, and normal sensory and motor function return in

Figure 3 Formation of a freeze ball during the freeze/thaw cycle.

Figure 5 Sloughing of the surface after 24 h.

Figure 6 Complete healing.

1–2 months.⁸ The procedure is usually free from complications such as haemorrhage, infection and pain. Inadvertent damage to adjacent structures or scar formation, seen with knife excision or electro surgery, is also limited.⁹ The procedure can be repeated without adverse effects. The advantage of this technique is that, unlike liquid nitrogen, it does not require specialised equipment for storing and applying liquid nitrogen to the

lesion. Canisters of butane–isobutane spray are readily available, and the delivery of the spray in controlled bursts is made with the help of a nozzle. The cost of training becomes nominal, and the procedure is easily taught and learned.

However, one disadvantage of this technique is the inability to extract a tissue specimen for microscopic examination to confirm the diagnosis; other problems are delayed healing due to necrosis and sloughing of tissue, which is inherent to this condition, including an unpredictable degree of swelling and lack of precision in assessing depth and area of freezing.¹⁰

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Contributors Uday Chowdary Birapu is the guarantor, conceived the idea for the article and identified and managed the case. RP performed the literature search and reviewed the literature. BK prepared the manuscript and reviewed the literature. SB helped in manuscript preparation and reviewed the literature.

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Learning points

- This use of refrigerant spray for the management of a mucocoele is unique, though there are numerous other techniques available.
- The technique described is free of pain and discomfort, and eliminates the need for local anaesthesia; it is also an economical and attractive alternative for the management of children with special healthcare needs.
- The procedure can be repeated without adverse effects.

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