Electrochemotherapy in Bone Metastases to Assess Pain in Palliative Intent: Case Report and Considerations in India

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Submission: January 11, 2016; Published: January 20, 2016

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Abstract

Electrochemotherapy (ECT), also known as electroporation therapy (EPT), is a local cancer treatment modality where the intracellular accumulation of a chemotherapeutic agent is enhanced in the presence of an electrical field by the phenomenon known as electroporation (EP). We treated a patient with breast cancer with skeletal metastases – D9-D10 Vertebrae and Left Public bone with bleomycin electrochemotherapy with needle electrodes. Pain assessed with Visual Analog Scale (VAS). The objective response from intolerable pain to tolerable was seen for the period of 1 year. Pain was assessed with frequent follow up from September 2014 till September 2015. Pain Score Comes down from 10 to 3. And the patient where can make Self drive. The route which was given Intravenously 15 units followed by Needle electrodes was inserted with help of radiological markings of D9-D10 and Left Pelvic bony area prior treatment. The response was significantly better with improved quality of life by control of pain. Metastases showed partial responses and local control of the diseases seen evidenced with PET Scan. Electrochemotherapy with bleomycin is an effective for bone metastases for pain and control of lesions is a feasible alternative in highly selected accessible (small, primary and big lesions) of the bony lesions.

Background

Osseous metastases are a frequent complication of neoplasias and are caused primarily by tumors of the breast, prostate, lungs, kidney and thyroid. Unfortunately at the time of clinical presentation, 75% of patients present one or more of the following complication pain: pathological fractures, medullar compression, hypercalcemia, reduction of movement and performance status. In the case of bone metastasis, together with the ablation of the lesion site there is the need to preserve the near and sensible structures around the metastasis: nerves, blood vessels or spinal cord. Moreover, the mechanical competence of bone tissue should be maintained to avoid the occurrence of pathological fractures.

Once the treatment options of radiation therapy have been exhausted, the possibilities of local control are limited and only options are Steroids, Pain killers and fentanyl patches and not much responding if the pain persist and severe. If the metastases do not respond well to radiotherapy and other pain control measures, a new ailment electrochemotherapy can be alternate therapy can be tried as remaining options for the patients. Because of its low side effects, electrochemotherapy is therefore an appropriate therapy for patients who have exhausted all other treatment options, which has to be studied lot by doing it to many patients.

Methods

We report a case of Ca. Breast with skeletal mets-D9-D10 Vertebrae. Metastatic Lesion in D9 Vertebrae. Patient under went palliative RT for D9-D10 and Pelvic bone lesions, but still pain continues and not responding to other pain control measures. Patient had a complaints of worse pain and cannot able to involve in daily house hold activities.

Prior treatment patient was sent for Radiological markings to represent the area to place the electrodes (D9, D10, and Lt. Pelvic Bone). Procedure was performed under local anaesthesia. Two electrodes were selected to insert the needle on to the bony lesions. Needles were inserted by piercing through the skin up to 3 cm distance till the resistance of the bone. Total 3 pulsations i.e., each one successful Pulsation on D9, D10 and Pelvic bone...
given after the resistance was considered. Patient was treated with 2 sittings of ECT at the interval of 2 weeks of each sitting according to the ESOPE (European Union Standard Operative Procedures for Electrochemotherapy) protocol administered Inj. Bleomycin 15 units IV followed by electrical pulses on the tumor site [1-6].

**Cancer indication(s):**
- Metastatic Lesion in D9 Vertebrae. Left Pelvic bone lesions.
- Infiltrating Ductal Carcinoma, Grade II-III Angiolymphatic tumor emboli.

**Summary of past treatment:**
- Mastectomy done
- Radiation done
- Chemo 6 cycles given

**Photographs before treatment:** Radiological Marking of D9, D10

**MRI Spine:** Impression: Metastatic Lesion in D9 Vertebrae, D10 Pedicle sclerosis: Before ECT

**MRI Lt. Pelvis Before ECT:**
PET scan Report after 6 months:

PET Scan image after 6 months:

Total treatment time - 15 minutes
Anesthesia and Sedation - Local anaesthesia and intramuscular sedation was given to patient.
Medicine – Inj. Bleomycin 15 units IV, 2 sittings at the interval of 2 weeks.

Figure 1: Bone metastases – D9, D10 and Left Pubic Bone. Before and After ECT and PET scan Reports after 6 months.

The Electrochemotherapy device allows for electroporation by means of the generation of an electrical low and an electrical high voltage impulse, which are applied to the tumour cells using specific electrodes. This makes possible the transfer of intracellular substances or molecules which would not normally be able to pass through the cell membrane. The emitted impulse lasts 100 µs, applied eight pulses, 1000V/cm. During implementation, both the applied voltage and the corresponding current curve are shown on the display in real-time, thus allowing for the effectiveness of each individual electroporation to be seen on the monitor. Prior to the start of the impulse generation, a low-dose cytostatic – usually bleomycin at a dosage of 15 units – is administered intravenously over one minute. Following a recommended time interval of 8 minutes, the administration of the electrical impulses begins. Special electrodes are used to generate an electrical field around the tumour. The cell membrane then opens and the cytostatic agent is able to accumulate in the cell at a high concentration. The procedure is performed under local anaesthesia. The best results are obtained when the impulse is applied within 25 minutes following administration of the chemotherapeutic agent.

Results

Pain score lessen from 10 to 3 followed by a year from September 2014 to September 2015 and control of lesions. Patient tolerated the treatment well with no residual effects from the electric pulses. Patient had no lesions in D9, D10 and skeleton except there is mild metabolic activity seen in left breast area with evidence of PET CT scans after 6 months. Pain lessen and tolerable. Quality life seen after Electrochemotherapy (Figure 1).

Conclusion

This case reports confirms that ECT has excellent pain control and lesions in Metastatic Bone Cancer. ECT may represent a new, effective possibility in the local treatment of bone metastases. The method is suitable for patients with severe co-morbidity and/or patients of an advanced age who have already exhausted all other treatments. Electrochemotherapy can be used to treat pain, bleeding and weeping metastases, as well as large lesions up to a depth of 4 cm. Furthermore, the implementation of electrochemotherapy can also result in the prevention of large scars and can also potentially result in preserved function e.g. of the arm in the case of severe lymphedema. On the whole, the quality of life of patients is improved by this procedure. Local tumour control is possible with the aid of electrochemotherapy. Furthermore, in contrast to radiotherapy, for example, repeatability is possible in the case of this method. The favourable cost-benefit ratio makes this method attractive.
References


