CASE REPORT

Therapeutic ultrasound as a treatment for chronic sinusitis

NOUREDDIN NAKHOSTIN ANSARI and SOOFIA NAGHDI Faculty of Rehabilitation, Tehran University of Medical Sciences, Iran
MOHAMMAD FARHADI Research Center of Ear, Nose and Throat, Iran University of Medical Sciences, Iran

INTRODUCTION

Chronic sinusitis is a disease that affects a significant percentage of the population and causes considerable long term morbidity (Brown et al., 1998). It is defined as a sinus infection that has persisted for longer than three months (Brown et al., 1998). Symptoms usually consist of nasal obstruction, facial fullness and nasal discharge. The cause of chronic sinusitis is multifactorial, with variation in the aetiology, bacteriology, stage of disease and treatment of the patient (Marks, 1998). Despite the use of modern antibiotics, recurrent and chronic sinusitis still cause significant morbidity in the general population (Forsgren et al., 1998). In fact, chronic sinusitis is acute sinusitis that has been treated unsuccessfully, resulting in irreversible changes and oedema of the sinus mucosa (Brown et al., 1998). When repeated adequate courses of antibiotics fail to eradicate an underlying chronic infection or to return the sinuses to normal, as judged by computerized tomography (CT) scan, the definitive treatment may be surgery (Lund and Kennedy, 1995) with removal of the diseased mucosa obstructing the sinus ostia to allow for improved sinus ventilation and drainage (Brown et al., 1998).

Therapeutic ultrasound has been reported to be one of the treatment modalities that can be used in sinusitis (Kahn, 2000) but the literature is lacking on reports of its effect. The present paper describes the use of therapeutic ultrasound as a treatment for chronic sinusitis.

CASE HISTORY

Miss B was a 23-year-old girl with a history of chronic sinusitis of six months’ duration, who complained of severe headache, post-nasal drip and nasal discharge. She had undergone medical treatment by her physician, an ear, nose and throat (ENT) specialist, but no improvement had been achieved. Because of persistent severe headaches (especially at the mornings), eye pain, nasal discharge, facial fullness and post-nasal drip, Miss B was admitted to the ENT Research Center at Hazrat-e-Rasoul Hospital in Tehran, Iran.

Miss B was a university student, living with her parents, and she was worried and
Miss B was anxious about her severe symptoms (Table 1). She had no allergies. Physical examination showed thick and purulent nasal discharge and post-nasal drip. A CT scan of the sinuses, with contrast, showed significant mucosal involvement of left maxillary sinus; slight mucosal thickening of the ethmoid sinuses, right frontal and left sphenoid sinuses was also noted. Nasal septal deviation with concavity toward the left side was seen. A bony spur in the right nasal space from the septum was evident. The nasopharynx soft tissue was normal and the rest of the sinuses were intact. Sinusitis was confirmed by the radiologist and the ENT specialist. Miss B was referred to the physiotherapy clinic at the Faculty of Rehabilitation of Tehran University of Medical Sciences for ultrasound therapy of left maxillary sinusitis. No other treatment was prescribed for her.

**USE OF ULTRASOUND**

Miss B underwent 15 sessions of therapeutic ultrasound treatment for three days per week, every other day. The parameters used for ultrasound therapy were:

- Frequency: 1 MHz.
- Intensity: 1 W/cm².
- Type: Pulsed (1:9).
- Duration: 5 minutes.
- Area of the treatment: local through the left cheek.

After the ultrasound therapy was completed, Miss B was referred back to the same ENT specialist. On re-examination, all her symptoms were improved and the CT scan with contrast showed no mucosal thickening of the involved sinuses. Both ostiomeatal complexes were open. All paranasal sinuses had a normal appearance and there was no evidence of mass lesion. A CT scan of the sinuses was interpreted by the same radiologist. Both the ENT specialist and the radiologist confirmed that Miss B’s sinusitis was completely resolved. Miss B was satisfied with the treatment and reported that her symptoms were improved.

**FOLLOW-UP**

The patient was followed up monthly for three months but she reported no recurrence of the symptoms.

<table>
<thead>
<tr>
<th>TABLE 1: Characteristics of the patient</th>
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<tr>
<td>Before</td>
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<tr>
<td>Headache</td>
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<tr>
<td>Eye pain</td>
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<tr>
<td>Nasal discharge</td>
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<tr>
<td>Type of nasal discharge</td>
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<tr>
<td>Post-nasal drip</td>
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<td>Type of post-nasal drip</td>
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<td>Main involved sinus</td>
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DISCUSSION

Sinusitis is an inflammation of the mucosal surface of the paranasal sinuses (Ferguson, 2000; Kern, 2000) in which retention of secretions results in inflammation and bacterial infection within the cavity. Blockage of the sinus ostia appears to initiate the cycle of events leading to sinusitis (Kennedy et al., 1995).

It is likely that oscillations of pulsed ultrasound have a mechanical effect and vibrate the secretions rapidly enough to disrupt bondings and loosen stagnant secretions, thus helping the drainage of the sinus, which is very important to sinus health (Kennedy et al., 1995; Bera and Rao, 1997), and breaking the pathological cycle of sinusitis.

By altering permeability of the cell membrane and accelerating phagocytosis (Evans, 1980), and the absorption of exudate, pulsed ultrasound may also help to reduce inflammation of the sinuses and open the ostial complex.

The present case history suggests that pulsed ultrasound may be used as a therapeutic modality for the treatment of chronic sinusitis. Further study is planned.

REFERENCES


Address correspondence to: Dr. Noureddin Nakhostin Ansari, Rehabilitation Faculty, Tehran University of Medical Sciences, Enghelab Ave, Pich-e-Shemiran Zip 14988, Tehran, Iran (Email: nakhostin@sum.tums.ac.ir).