Microwave Diathermy Treatment for Primary Dysmenorrhea

This case report documents the use of microwave diathermy in a 31-year-old woman who had had primary dysmenorrhea since menarche began at age 13 years. For 18 years, she had severe monthly pain, frequently resulting in emergency department admissions and 1 to 3 days lost from work. Conventional treatments, including pain-relieving drugs, anti-inflammatory drugs, muscle relaxants, superficial heat, and oral contraceptives, had all been unsuccessful in relieving or abating the intense and debilitating pain. Microwave diathermy (45 W total power) was administered for 20 minutes each month on the day symptoms began (usually the first day of menstruation). Over a 7-month interval, diathermy was followed by almost-immediate and long-lasting relief of symptoms. During the 7 months of treatment, the patient lost no workdays due to severe pain. This case demonstrates the potential use of microwave diathermy as an effective treatment for women with this condition. [Vance AR, Hayes SH, Spielholz NI. Microwave diathermy treatment for primary dysmenorrhea. Phys Ther. 1996;76:1003–1008.]

Key Words: Diathermy, Dysmenorrhea, Physical therapy.

April R Vance
Sherrill H Hayes
Neil I Spielholz
Primary dysmenorrhea is the single greatest cause of absence from school and work among women of menstruating age.

Dysmenorrhea (painful menstruation) affects between 40% and 95% of menstruating women. Two types of dysmenorrhea have been identified: primary (associated with normal ovulatory menstrual periods and normal pelvic examination) and secondary (associated with pathology, as in pelvic inflammatory disease, endometriosis, or use of an intrauterine device). Primary dysmenorrhea, the subject of this case report, is one of the most frequent gynecologic disorders, with about 10% of women affected being incapacitated for several days each month. Primary dysmenorrhea has been estimated to cause the loss of 140,000,000 work hours annually. It is the single greatest cause of absence from school and work among women of menstruating age.

Symptoms of primary dysmenorrhea are the following: Pain is spasmatic and is usually felt in the lower abdomen, although sometimes the pain radiates to the back and thighs; the pain usually begins just before or at the onset of menstruation; and other symptoms may include nausea, vomiting, headache, diarrhea, low back pain, dizziness, and, in severe cases, syncope and collapse. The symptoms last from several hours to several days, rarely exceeding 3 days, and tend to decrease or disappear after the individual has experienced childbirth the first time and to decrease with age.

The pain of primary dysmenorrhea is believed to be due to increased prostaglandin production by the endometrium, leading to increased contractility of the myometrium and resultant ischemia. The use of prostaglandin inhibitors (eg, ibuprofen, aspirin), which block prostaglandin synthesis, is the primary pharmacological treatment to manage the pain of primary dysmenorrhea. Endometrial prostaglandin synthesis is also inhibited by progesterone, which is why oral contraceptives are often prescribed to reduce the severity of primary dysmenorrhea. Oral contraceptives also have been used to suppress ovulation, as primary dysmenorrhea occurs only if preceded by ovulation. Psychological support has been offered, although primary dysmenorrhea is not a behavioral or psychologic disorder. Physical therapy has offered transcutaneous electrical nerve stimulation (TENS), heat, and exercises, although exercise does not influence the severity or prevalence of dysmenorrhea.

A MEDLINE search encompassing the period 1966 to June 1995 yielded no research reports relating to the use of diathermy for primary dysmenorrhea. A search using the key words "primary dysmenorrhea and TENS" yielded five articles. All of these articles described studies of patients with primary dysmenorrhea using TENS and ibuprofen compared with ibuprofen only and found that subjects required a lesser dosage of ibuprofen for pain management with the addition of TENS. Smith and Heltzel found that although TENS decreased the pain of dysmenorrhea, uterine contractions continued. This finding gives credence to the belief that uterine activity causes pain in primary dysmenorrhea and that TENS provides analgesia by an alteration of the body's ability to receive or perceive the pain signal.

Pelvic inflammatory disease (PID), although distinct from primary dysmenorrhea, causes similar symptoms of severe debilitating pelvic and abdominal pain, often accompanied by nausea and vomiting, which is unresponsive to traditional pain-relieving medications, antibiotics, or modalities. Although the exact cause of primary dysmenorrhea is unknown, PID is caused by bacterial infections, the most common of which are Neisseria gonorrhoeae and Chlamydia trachomatis. Using the key words "diathermy and pelvic inflammatory disease," a second MEDLINE search yielded only one reference, a case report in Physical Therapy. The patient had constant and diffuse abdominal pain radiating to the lumbar region due to PID. Following a series of nine treatments with shortwave diathermy (SWD) over a short period of time (less than 3 weeks), the patient was pain-free, and remained so for 6 months after treatment (at the time the case report was written).

A review of recent physical therapy textbooks uncovered three references that describe the treatment of PID with either SWD or microwave diathermy (MWD), but these references were not research based. A review of

AR Vance, PT, BSN, is Co-owner, Relax-the-Back Store, 2020 Glen Echo Rd, Nashville, TN 37215 (USA) (backrelax@aol).
Address all correspondence to Ms Vance.

SH Hayes, PhD, PT, is Professor and Director, Division of Physical Therapy, University of Miami School of Medicine, 5915 Ponce de Leon Blvd, Coral Gables, FL 33146.

NI Spielholz, PhD, PT, is Associate Professor, Division of Physical Therapy, University of Miami School of Medicine.

This article was submitted October 10, 1995, and was accepted June 11, 1996.

1004 . Vance et al

rehabilitation medicine textbooks written before 1960 also yielded descriptions of SWD and MWD in treating PID (usually secondary to gonorrhea), with references to earlier research papers. More recent rehabilitation medicine textbooks, if they do mention PID, still refer to articles written in the 1930s and 1940s, or to the book chapters mentioned earlier. Antibiotics have apparently lessened the need for "deep heating" techniques in treating patients with PID from the medical management perspective. Nothing could be found in the literature documenting the use of either SWD or MWD in treating patients with primary dysmenorrhea.

Diathermy utilizes high-frequency electromagnetic waves to heat deep tissues, especially those with high water content. Presumably, dissolved molecules and ions oscillate at the frequency of the reversing electromagnetic field, generating heat. Skin, especially when dry, contains relatively little water, and thus becomes only mildly heated. Deeper structures, such as muscle, extracellular fluid, and blood, are heated more selectively.

Microwave diathermy utilizes higher-frequency electromagnetic waves than does SWD (2,450 MHz versus 27.12 MHz). These higher-frequency transmissions, generated by a magnetron, are focused and "beamed" into the tissues from varying distances. The selection of SWD or MWD is correct when the desired treatment outcome is to raise tissue temperature, increase extensibility of deep collagen tissue, decrease joint stiffness, relieve deep pain and muscle spasm, increase blood flow, and assist in the resolution of inflammation. Potential hazards with either type of diathermy are from internal and external metallic objects and electromedical devices at the treatment site, including metal implants and metallic intrauterine devices. People using metallic intrauterine devices should not receive either diathermy modality to the lumbar, pelvic, or abdominal area. In addition, SWD and MWD are generally contraindicated in the presence of hemorrhage.

The frequencies used for SWD and MWD are too fast to depolarize nerve or muscle membranes. Thus, neither innervated nor denervated muscles contract. This factor is important because the pain of primary dysmenorrhea is believed to be caused by the contraction of the muscles of the uterus and further contraction of these muscles would not be desired. The Federal Communications Commission regulates the frequencies that can be generated by medical devices. In the United States, the assigned frequencies for SWD are 13.56, 27.12, and 40.68 MHz, whereas 2,450 MHz is reserved for MWD.

The effectiveness of diathermy treatment depends on its intensity and duration. A recent German article reported close correlations between magnitude of blood flow, length of treatment, and therapeutic intensity. The 20-minute treatment was the most effective treatment. Therapists must use the patient's heat-sensation response as a guide for dosage. Table 1 defines the four types of dosages that are used. Documentation of treatments should include the following: (1) type of electromagnetic energy; (2) commercial model name; (3) type of applicator used; (4) description of where on the body the applicator was applied or directed; (5) duration of treatment; (6) power output level; (7) pulse frequency and duration, if pulsed diathermy is used; and (8) the patient's response to the treatment.

### Case Description

The patient was a 31-year-old woman who complained of extremely painful cramping, beginning with her initial menses at age 13 years. She was subsequently diagnosed with primary dysmenorrhea. The history revealed cramping severe enough to warrant regular monthly visits to the emergency department. The emergency department visits were necessitated, according to the patient, due to the increase in severity of pain throughout the day and the unavailability of her physician in the evening. Her signs and symptoms included severe pelvic and abdominal pain lasting 3 days, accompanied by the passage of large clots, the inability to stand erect (due to pain), nausea, vomiting, headaches, backaches, and hot flashes. She described the pain as a "killing pain," which kept her awake at night. During this time, if untreated, she was reduced to tears and remained in bed until the symptoms subsided sufficiently to resume regular activity.

When seen in the emergency department, treatment consisted of powerful pain-relieving drugs (Demerol, administered intramuscularly) and return home with prescribed Tylenol #3. Home treatments of heating pads applied to her pelvis and back were minimally effective. These periods of pain made it impossible for her to attend school or work or to care for her husband and two small children. She missed 1 to 3 days of work per

<table>
<thead>
<tr>
<th>Dose</th>
<th>Level</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Lowest</td>
<td>Just below the point of any sensation of heat (acute inflammatory process)</td>
</tr>
<tr>
<td>II</td>
<td>Low</td>
<td>Mild heat sensation, barely felt (subacute, resolving inflammatory process)</td>
</tr>
<tr>
<td>III</td>
<td>Medium</td>
<td>Moderate, but pleasant, heat sensation (subacute, resolving inflammatory process)</td>
</tr>
<tr>
<td>IV</td>
<td>Heavy</td>
<td>Vigorous heating that produces a well-tolerated sensation (chronic conditions; the pain threshold may be reached, but the output is immediately lowered to just below maximal tolerance)</td>
</tr>
</tbody>
</table>

Table 1. Definitions of Dosage, According to Kloth.
month because of pain due to primary dysmenorrhea. Her physician had stated the possibility of a decrease in her symptoms after the birth of her children and subsequent use of oral contraceptives, but her symptoms remained undiminished and continued to disrupt her life.

The decision to try a deep heating technique with this patient was based on the following reasoning. A superficial heating technique (hot packs) had afforded slight and temporary relief, and a deeper heating technique may more effectively heat the uterus and have a better pain-relieving effect by improving blood flow through the myometrium, thereby facilitating "washout" of the presumed pain-producing substance, prostaglandins. Although hemorrhage, or uncontrolled bleeding, is considered a contraindication for deep heating, the patient’s physician did not classify her menses as "uncontrolled bleeding." It was therefore decided to move ahead cautiously with a deep heating technique.

After written permission was obtained from the patient’s physician and it was determined that she had no metal implants or intrauterine devices, monthly treatments of MWD were instituted. Each treatment was initiated on an as-needed basis the day her symptoms began, which usually coincided with her first day of menstruation. This schedule was facilitated because she worked at the medical center where she received physical therapy.

All treatments were given with a TAG MED model TDS 2450–2 MWD system. A circular applicator with a 16.25-cm diameter was used to deliver all treatments (Figure). During each treatment, the patient was positioned side-lying with the applicator placed anteriorly 15.24 cm (6 in) from her area of pain, the pelvic region. Power options on the TDS 2450–2 MWD system were "low" (0–15 W) and "high" (0–150 W). The dosage was selected by the patient’s reports of a moderate, yet comfortable, feeling of warmth. This dosage corresponded to a level III dosage, as defined in Table 1. During each treatment, the patient received 45 W of total power for 20 minutes. As the patient had no loss of sensation and no damp clothing or clothing with metal objects, all treatments were delivered through her clothing. She received one treatment per month as needed, except during the first month (September), when she received one treatment on two consecutive days due to the severity of her pain.

The patient used a pain scale (0–10) similar to that used by Balogun and Okonofua to measure her levels of pain at four different time intervals: (1) before treatment, (2) immediately after treatment, (3) 6 hours after treatment, and (4) 24 hours after treatment. The definitions given to this scale (for the patient’s reference) included 0=pain-free, 5=enough pain to stop activity, and 10=the need to go to the emergency department. Table 2 summarizes the patient’s pain ratings according to the months her pain was monitored (September 1993–March 1994) and the time intervals for the rating of her pain before and after each treatment.

**Outcomes**

Initially, the patient required two treatments 24 hours apart. On the first day, her pain was rated 9/10, with the accompanying symptoms of intense nausea, vomiting, backache, headache, hot flashes, and the inability to stand erect. Immediately after treatment, she rated her pain as 1/10. On the second day, she rated her pain as 4/10 and was experiencing the accompanying symptoms, although they were less intense than during the previous day. All pain and symptoms experienced on the second day resolved after the second diathermy treatment. This was the only time she required two consecutive days of treatment.

In October, the patient rated her pain 0/10 (no pain) at the onset of her menses. This was the first month without pain or the accompanying symptoms since her initial menses at age 13 years. No treatment was given during the month of October. The pain in November was rated 6/10 before treatment and 2/10 immediately after treatment. During the 6- and 24-hour time periods following

---

*TAG MED Inc, Boulder, CO 80302.
treatment, she reported no pain. On the day of the patient’s onset of menses in December, her therapist was ill and not available to deliver the treatment. Her pain, however, was rated 4/10 and was manageable with ibuprofen taken every 3 hours. She was also able to perform her work duties without interruption. No treatment was given in January, when she again reported having no pain. In February, the patient rated her pain 8/10 before treatment, which was reduced to 3/10 immediately and 6 hours after treatment. She was pain-free 24 hours after treatment. During March, the last month monitored, she was also without pain and no treatment was delivered.

The patient reported that she had never experienced a pain-free menses before treatment began. She also reported that after the treatments began, her menstrual flow reduced slightly and there were fewer blood clots. This remained consistent throughout the monitored months. She reported her accompanying symptoms (nausea, hot flashes, vomiting, backache, headache) also were reduced or resolved in correlation to her pain. During the 7 months from September 1993 to March 1994, she lost no workdays due to her primary dysmenorrhea. A follow-up contact was made in August 1995, which the patient reported she no longer had.

### Table 2.
Pain Rating on a 0 to 10 Scale Before and After Microwave Diathermy (MWD) Treatment for Primary Dysmenorrhea

<table>
<thead>
<tr>
<th>Time of Pain Measurement</th>
<th>Before MWD</th>
<th>Immediately after MWD</th>
<th>6 hr after MWD</th>
<th>24 hr after MWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 1993 Day 1</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>September 1993 Day 2</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>October 1993</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>November 1993</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>December 1993</td>
<td>4&quot;</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>January 1994</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>February 1994</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>March 1994</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Therapist was not available for treatment on this day; pain was managed with analgesics.

The potential success of this treatment for women with severe primary dysmenorrhea suggests that the approach warrants further study. The treatment also may be cost-effective if it eliminates overuse of an emergency department for relief of pain, eliminates lost workdays due to illness, and improves the patient’s ability to care for her family without lost days due to pain and inability to function. Suggestions for research on the use of diathermy in patients with primary dysmenorrhea are to apply this treatment to a larger group of similarly affected patients, to contrast the effectiveness of diathermy compared with TENS for patients with primary dysmenorrhea, and to compare the effectiveness of SWD with that of MWD in alleviating pain in patients with primary dysmenorrhea.

### References
6. Dawood MY, Ramos J. Transcutaneous electrical nerve stimulation (TENS) for the treatment of primary dysmenorrhea: a randomized


---

**Call for Reviewers**

*Physical Therapy* is currently seeking qualified individuals to serve as manuscript reviewers. Reviewers should have:

- Extensive experience in area(s) of content expertise
- Experience as authors of articles published in peer-reviewed journals

Familiarity with peer review is essential.

If you are interested in becoming a reviewer for the Journal, please send a cover letter and a copy of your curriculum vitae to:

Editor  
*Physical Therapy*  
1111 North Fairfax Street  
Alexandria, VA 22314-1488

Interested in becoming involved, but not sure you have the time to review manuscripts? The Journal is also looking for article abstracters and book/software/videotape reviewers. Send us a letter expressing your interest and stating your general areas of expertise, along with a copy of your curriculum vitae. We look forward to hearing from you.