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Summary: Chordomas are the most common sacrococcygeal tumors in adults. They have a high recurrence rate, are locally aggressive, and are resistant to radiation therapy. Radio frequency is a relatively new therapeutic technique, used primarily in the treatment of liver tumors; however, its application has widened to include other neoplasms. We report its use in the palliative treatment of chordomas in two patients for debulking and control of pain, with good results and low morbidity.

Chordomas (1, 2) are the most common primary malignant tumors of the spine in adults, excluding lymphoproliferative neoplasms. Between 50–66% of chordomas occur in the sacrococcygeal region. The usual treatment is surgical resection, either radical or palliative, followed by radiation therapy. Nonetheless, the recurrence rate is high, reaching almost 100%. Radio frequency is a well-established technique used for the treatment of soft tissue tumors of the liver and kidney, (3–6) the adrenal and parathyroid glands, and the breast (7). It is also used for the treatment of bony tumors such as osteoid osteoma (8), chondroblastoma (9) and metastatic bone disease (10).

A review of the literature reveals a single case report describing the use of radio frequency in the treatment of sacral chordomas (11). We present two cases of postoperative recurrent sacral chordoma treated palliatively, by using radio-frequency ablation.

Case Reports

Case 1

A 72-year-old man presented on September 22, 2000 for a progressively worsening painful sacral mass of a few years’ duration, dysuria, and constipation (Fig 1). MR imaging showed a 15-cm mass originating from the sacrum and extending up to S3 and anteriorly involving most of the pelvis, compressing the rectum and bladder. Complete surgical excision of the tumor with free surgical margins on pathologic examination was performed. Between February and November 2001, he underwent surgery twice for local recurrence at the surgical bed and metastasis to regional inguinal and iliac lymph nodes. Follow-up MR imaging examinations showed rapid recur-

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terminal left colostomy was made to correct a megarectum. A rapid recurrence of the deepest tumoral masses occurred, with remarkable increase in size over 5 months, resulting in uncontrollable pain and difficulty in sleeping and lying supine.

In January 2003, the patient’s symptoms worsened, with the appearance of severe pain along the left S1 nerve root territory. Unable to walk, she was completely bedridden. She was admitted on March 3, 2003. MR imaging was performed, and only a transverse T2 series could be obtained. It showed a 22-cm mass completely invading the pelvis and the region of the left buttock with lack of visualization of the left sciatic nerve, which is not clearly defined and probably encased. Note the presence of invasion of the perineum bilaterally shows regional invasion of the posterior pelvic wall with invasion of the sacrum, the piriformis muscle, and bilateral extension into the gluteus muscles. In addition, a metastatic deposit is seen anterior to the left sartorius muscle. Large metastatic iliac nodes are also noted.

C, obtained in August 2003 (8 months later) at approximately the same level as A, shows the first site treated devoid of tumor tissue (single arrow). The component at the skin remains intact. The third site treated (double arrows) shows debulking of the tumor. Note that the left sciatic nerve tract and the fat planes surrounding it are better visualized, because of the retraction of the tumor secondary to ablation (arrowheads). Also note the increase in the extent of the involvement of the perineum with significant compression of the structures within it. The nontreated mass in the left gluteus muscle, laterally, increased in size.

D, obtained in August 2003 at approximately the same level as B, shows the sacral masses, which were treated with significant loss of substance and volume. Note the reexpansion of the spaces at both sciatic notches with resultant decompression of both sciatic nerves tracts (single arrow). Also note the remarkable increase in the involvement of the pelvic cavity with compression of the pelvic structures along the midline. There are also now more tumoral masses in the nontreated areas at the gluteus muscles bilaterally with atrophy of the left gluteus muscle.

Discussion

Chordomas originate from embryonic remnants of the notochord-ectopic cordal foci; hence, they may
occur anywhere between the clivus and coccyx. They are the most common primary malignant tumors of the spine in the adult, excluding lymphoproliferative neoplasms. They present between the ages of 30–70 years, with a male-female ratio of 2:1. They represent 1–4% of all primary malignant spinal tumors. Between 50–66% of chordomas occur in the sacrococcygeal region, usually in the 4th or 5th sacral segments, 35% at the base of the skull, and around 15% in the spinal axis. In addition, 5% occur at other sites such as the mandible, maxilla, and scapula.

The metastatic rate varies between 5–43%, with a predilection for the liver, lung, regional lymph nodes, and rarely, the skin, peritoneum, and heart. Patients usually present with low back pain and symptoms of mass effect such as sciatica, constipation, or fecal incontinence, frequency, urgency, and dysuria. They may present with rectal bleeding in 32% of cases and a palpable sacral mass in around 20%. On diagnosis, the average size is around 10 cm. Despite a 100% recurrence rate, surgery is still used with the goal of radical resection. This is difficult to achieve in most of the cases because of high morbidity and the presence of adjacent important structures, including the sciatic nerves. Only 8% of patients show a disease-free survival rate. Chordomas are radioresistant. Therefore, in the presence of aggressive recurrences, only palliative treatment could be proposed.

Radio frequency is a well-established technique, used initially for unresectable liver tumors, whether primary or secondary. The indications for its use were extended to tumors of the adrenal and parathyroid glands, kidneys, and breasts and osteoid osteoma and chondroblastoma. To the best of our knowledge, only one case report has been published describing the use of radio frequency in the treatment of sacral chordomas (11).

Radio-frequency ablation consists of applying energy from a generator to an electrode needle, which is inserted within the tumor, generating heat at the tip of the needle, with temperature reaching around 100°C, leading to thermal destruction of tumor cells. It is a simple procedure, which can be performed on an outpatient basis, is minimally invasive, and leaves no scars. As in the treatment of liver cancer, it can be performed under local anesthesia. The total procedure time is around 1 hour.

The limits of the areas of necrosis can be well controlled by sonography or CT and determined by the power used, time in which radio frequency is applied, and the diameter of the needle used: in the first session of our first patient, we used the same parameters as in the treatment of liver cancer, with close monitoring by CT scanning. As predicted, chordomas responded like liver tumors with similar areas of tumoral ablation obtained, using similar parameters. This may be due to the fact that chordomas consist of large vacuolated cells containing intracytoplasmic mucus and an abundant amount of extracellular mucus; hence, theoretically, they have good conductivity. In fact, the impedance, which indicates tissue resistance, did not increase during the different sessions, further confirming the good conductivity of the chordoma tissues.

Conclusion

The morbidity associated with this procedure was low, consisting of transient malaise and oliguria in one patient. Furthermore, repeated MR imaging controls over a 7-month period showed absence of recurrence at the treated sites, as opposed to continued growth at the nontreated sites. The cost of a radio-frequency needle in our country and, presumably abroad as well, varies between $US 400 and $US 600 (including the use of the machine and depending on needle size).

References