

Orthopaedic Hospital of the Invalid Foundation, Helsinki, Finland.

FEMORAL NERVE COMPRESSION SYNDROME WITH PARESIS OF THE QUADRICEPS MUSCLE CAUSED BY RADIOTHERAPY OF MALIGNANT TUMOURS

A Report of Four Cases

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Tissue lesion due to radiotherapy which has caused compression of the femoral nerve and paresis of the quadriceps muscle is obviously rare because no reports on this complication have been found in the literature. Similar lesions in the upper limbs caused by compression syndrome of the brachial plexus following treatment by radiation of cancer of the breast have been reported (Westling et al. 1968, 1972, Mumenthaler 1964, Stoll & Andrews 1966, Notter et al. 1970). Also there have been a few reports of femoral nerve injury in connection with vaginal hysterectomy (Hopper & Baker 1968).

Because the syndrome is little known and the diagnosis and treatment are of orthopaedic interest, it seems relevant to report the following four cases.

CASE REPORTS

Case 1. I.G. A 67-year-old former secretary was operated in July 1962 with a total hysterectomy and bilateral oophorectomy because of an adenomatous grade II carcinoma of the uterus. Postoperatively she received pendel convergence X-ray therapy on both parametric regions for 3 months; the deep dose was 3,600 rad and filter 0.2 Cu was used on both sides. After december 1963 the patient was bothered by persistent radiating pain in front of the right femur. Early in 1964 a decrease of the power and atrophy of the right quadriceps muscle was noted. Since 1967 there had also been a slight pain in front of the left femur. The patient was first seen in the Orthopaedic Hospital of the Invalid Foundation in April 1968. Examination revealed hard infiltrates cranial to both inguinal regions. Manual compression of these infiltrates caused radiating pain in front of the femora. There was a 3 cm atrophy of the right thigh. The patellar reflexes were lacking bilaterally, but the Achilles reflexes were present. Sensitivity was normal. The power of the right

quadriceps had decreased to strength 1-2 and the power of the left quadriceps to 2-3. EMG showed giant potentials and decrease of number of motor units in both quadriceps muscles and also in the right adductor muscles.

Neurolysis of the right femoral nerve was performed in July 1968 (Laurent). In the inguinal region, firm scar tissue which compressed the femoral nerve was found. The nerve was flat and fibrotic. The inguinal ligament was incised and the nerve was freed for a length of 10 cm. After operation the pain lessened significantly but there was no change in the strength of the quadriceps muscle. The patient still had difficulty in walking, the right knee sometimes giving away. At follow-up 1 year later the patient stated that the pain had lessened still further and was sometimes entirely absent. The power of the right quadriceps muscle had not altered during the observation time. The patient died in 1972 of cardiovascular disease.

Case 2. A.L. A 43-year-old truck driver. In August 1968 a diagnosis of malignant melanoma of the skin distal to the right costal arch was made. The tumour was extirpated and the patient received local pre-operative electron radiation therapy (15 MeV, 4000 rad) which was repeated post-operatively. In January 1969 a metastasis appeared in the right inguinal region and a local excision was done. Post-operatively the patient was given electron radiation therapy 6000 rad to the right inguinal region. In the summer of 1970 the patient had pain which radiated to the front of the right femur. A year later the power of the right quadriceps decreased. EMG investigation in August 1971 showed giant potentials and a decrease in the number of motor units, the strength of the muscle being only 1-2.

During the summer of 1972 the pain increased considerably, and in September 1972 an intradural injection of phenolglycerin at the level L 3-4 on the right side was given. The pain disappeared after this treatment.

The patient was treated in November 1972 in the Orthopaedic Hospital of the Invalid Foundation. In the right hip there was a flexion contracture of 30° and the right quadriceps muscle was significantly atrophied, the strength being 1. Sensitivity had diminished in the front of the right thigh and on the medial side of the leg. The patellar reflex was lost but the Achilles reflex was still present. Caudal to the inguinal ligament a tender, firm infiltrate was found. At operation it turned out to be an abscess containing haemolytic streptococci. Post-operatively no change in the power of the quadriceps muscle was noted and the patient was still unable to extend the knee against gravity. Because of this the patient fell in March 1974 and fractured the right patella. His general condition was good and no metastases were found.

Case 3. P.B. A 37-year-old translator. In March 1966 a total hysterectomy and bilateral oophorectomy was performed because of an epidermal carcinoma of collum uteri. The operation was carried out in Havana, Cuba. Post-operatively she received 34 applications of X-ray therapy on the parametria, the total dose being 27,200 rad. The therapy was given from both front and back. Two years later the patient noted a decrease in strength of both quadriceps muscles. Because of this she sustained malleolar fractures in 1971 and 1974. The patient was admitted to the Orthopaedic Hospital of the Invalid Foundation in January 1975. Examination revealed hard, pigmented infiltrates cranial to both inguinal regions and on both gluteal regions. The strength of both quadriceps muscles had decreased to 3. In the left thigh there was a muscle atrophy of 2 cm. The patellar reflexes were lacking

bilaterally. Sensitivity was decreased bilaterally in the front of the thigh and on the medial side of the leg. EMG showed giant potentials and a decrease in number of motor units in both quadriceps muscles. She had no pain. A neurolysis was considered but postponed.

Case 4. A.S. A 53-year-old nurse. The patient had a hysterectomy in 1959 due to myomatosis. A bilateral salpingo-oophorectomy was performed in April 1962 because of malignant cystadenoma of the right ovary. Post-operatively the patient received pendel convergence X-ray therapy, 3000 rad, filter 0.2 Cu on both parametric regions. She had, in addition, steady field treatment on the umbilical region, the deep dose being 1,848 rad, filter 1.0 Cu. She was also treated with Sendoxan. In December 1962 a painful infiltrate occurred cranial to the right inguinal region. The tumour which was situated in the internal oblique muscle was extirpated (Laurent). PAD: Partly necrotised muscle tissue damaged by radiotherapy. No metastases were seen in the peritoneal cavity. In May 1963 the patient noticed pain in the front of the right femur and a slight decrease in the power of the right quadriceps muscle. In August the pain had increased and radiated to the medial side of the leg. The strength of the quadriceps muscle was 3. Prednisolone, 4 mg daily, and oxiphenbutazone 300 mg daily, were prescribed for 2 months. During the treatment the pain disappeared and in May 1964 the power of the quadriceps muscle was almost normal. In 1968 the patient died of metastases in the liver.

DISCUSSION

Each of the four patients received radiation treatment of the inguinal region because of malignant tumours. In my opinion the fibrosis following X-ray treatment caused compression of the femoral nerve. The first symptom of nerve compression was pain radiating in the front of the thigh and the medial part of the lower leg. Three of the four patients had pain. Several months after the pain began, a decrease in the power of the quadriceps muscle occurred, and three of the patients had difficulty in walking. One patient got a patellar fracture and another suffered malleolar fractures due to the palsy of the quadriceps muscle. EMG investigation in three cases showed typical signs of peripheral lesion of the femoral nerve.

In the first case, a decompression of the femoral nerve was performed and it was seen to be compressed by scar tissue. Pain greatly decreased after operation, but paresis of the quadriceps muscle remained unchanged. In the second case a very severe pain disappeared after intradural phenolglycerin injection. The palsy of the quadriceps muscle here seems to be permanent, and decompression of the femoral nerve will hardly lead to further improvement. The third patient is painless, a decompression operation is considered but postponed. In the fourth case, with only moderate symptoms, the pain disappeared after

2 months' treatment with cortisone and oxiphenbutazone. The quadriceps power gradually returned in the course of 6 months.

In the first three cases it seems to me that it was the fibrosis due to the radiotherapy which gradually led to compression of the femoral nerve. In the first case the radiation dose was relatively small, but at operation the femoral nerve was obviously compressed by X-ray damaged scar tissue. The patient died 4 years later of cardiovascular disease. No metastases were found at autopsy.

In the third case the total dose of radiotherapy, 27,200 rad, was unusually large.

In the fourth case the question is open as to whether the transitory nerve compression syndrome was caused by radiotherapy, as the dose was relatively small. The patient died 5 years later of metastases of the liver. An exploratory laparotomy performed 2 years previously had not revealed any signs of metastases.

The related compression syndrome of the femoral nerve seems to be of orthopaedic interest, both clinically and therapeutically, because pain may be relieved by an operative decompression of the nerve. Function of the quadriceps muscle, however, does not seem to improve.

A change in the technique of radiation therapy is possibly needed. In giving radiation in doses large enough to be effective, the risk of such complications probably cannot be entirely eliminated (Westling et al. 1968).

SUMMARY

Four patients showed signs of femoral nerve compression with subsequent paresis of the quadriceps muscle, after radiation therapy of malignant tumours. The compression was caused by scar tissue due to radiation treatment of the inguinal region. The first symptom was radiating pain in the front of the thigh and lower leg which appeared 12-16 months after X-ray treatment. A decrease in the strength of quadriceps muscle occurred some months later.

In one case the femoral nerve was decompressed, another patient was treated by an intradural phenolglycerin injection and one patient was treated with cortisone and oxiphenbutazone. In these cases the pain decreased considerably, but in one case only the paresis of the quadriceps muscle improved after treatment.

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