Neuropathic Arthropathy of the Elbow: A Report of Two Cases

Aasis Unnanuntana MD*, Saranatra Waikakul MD*

* Department of Orthopaedic Surgery, Siriraj Hospital, Mahidol University

Background: Neuropathic arthropathy (charcot joint) of the elbow is a rare condition. It is among the least frequently reported charcot pathology of the joint. The clinical symptoms are characterized by a painless and unstable joint. Infection in the neuropathic joint is rare. Only a limited number of cases have been reported in the literature. The authors present two cases of neuropathic arthropathy of the elbow. One of them was diagnosed as Septic neuropathic arthropathy.

Material and Method: Two patients with neuropathic arthropathy of the elbow (an infected and a non-infected case) were treated at our department. Both patients were over 60 years old. The underlying conditions associated with the arthropathy included combined median and ulnar neuropathy in the infected case and idiopathic in the non-infected case. Both of the patients had a history of specific trauma at the affected elbows. The radiographs of the elbows revealed dislocation, fracture fragmentation and some bony sclerosis. The management in the non-infected case aimed to maintain the function of the elbow with a short period of immobilization and physical therapy. For the infected case, the patient was treated successfully with systemic antibiotic, surgical debridement and a period of immobilization with an external fixator.

Results: The patients were followed-up for approximately 9 months for the non-infected and 2 years for the infected case. Both of them had painless and functional range of motion of the elbows in the most recent follow-up examination. For the infected case, the surgical incision healed well and there was no recurrent discharge from that affected elbow.

Conclusion: In the first case, with neuropathic arthropathy of the elbow, the investigations were made to find the underlying disease. The second case with septic neuropathic joint, systemic antibiotic, surgical debridement and appropriate immobilization were needed. With gross instability and marked distortion of the joint, the elbow of both patients functioned remarkably well.

Keywords: Neuropathic arthropathy, Charcot joint, Elbow, Septic, Infected joint, Idiopathic, Combined median and ulnar nerve palsy

J Med Assoc Thai 2006; 89 (4): 533-40

Full text. e-Journal: http://www.medassocthai.org/journal

The neuropathic arthropathy (charcot joint) is a joint that lacks the ability to respond via reflexes to abnormal stress. Consequently, the subchondral bone of the involved joint disintegrates, leading to joint collapse and considerable joint deformity. Conventional radiography is the most commonly used imaging modality for diagnosing neuropathic arthropathy. The disease is mostly of the hypertrophic type and is manifested as soft-tissue swelling, subluxation, para-articular debris, osseous fragmentation and disorganization.

The joints most frequently affected by charcot pathology are the weight bearing joints, predominantly the mid foot but also the ankle, knee, hip and elbow. According to Johnson who had conducted a study of 118 cases with neuropathic arthropathy, the pattern of joint involvement was dependent upon the neurological condition. For example, in Tabes dorsalis, joint destruction was predominantly in the knee; in syringomyelia, joint destruction was predominant in the...
upper extremity; and in Diabetic neuropathy, foot and ankle destruction was predominant(6).

The elbow is among the least frequently reported joints compromised by the charcot pathology. Generally, Tabes dorsalis and syringomyelia are the most common causes of neuropathic arthropathy of the elbow(4). We retrospectively reviewed the records and radiographs of two patients with neuropathic arthropathy of the elbow. One of these two patients was presented with septic arthritis.

**Case Reports**

**Case 1**

A 66-year-old female came to our department with a five-day-long history of pain in her left elbow. She had a history of a fall to the ground on her left elbow 3 years ago but did not have any surgery or casting. She could use her left elbow as usual, seven days after the injury. Five days before coming to the hospital, while she was turning a doorknob, she felt pain at the medial aspect of her left elbow. The pain was minimal but persistent, so she came to the hospital. She had another two episodes of fracture. The first episode was about 30 years ago. The diagnosis was a fracture of right distal end radius that was treated by cast treatment for 6 weeks. It is now malunited without any clinical symptom. The other fracture was about two years ago. The diagnosis was a fracture of the medial epicondyle with marked displacement. She was treated at our department. While we planned to perform an operation, we had to change to a conservative treatment because of her past medical history. She was treated by placing on a long arm slab for three weeks and then early range of motion was permitted. There was no clinical symptom at her right elbow and she could perform her usual activities as before. She has had hypertension for 30 years and severe persistent asthma which was diagnosed about forty years ago, for which she has received medication regularly. She does not smoke or drink any alcoholic beverages. Review of other systems except the above was unremarkable.

On physical examination, the left elbow was deformed with minimal tenderness at the medial aspect. The range of motion was 140/0/25. There was gross instability of the left elbow shown in valgus and varus stress test. The motor power was grade V/V in both upper and lower extremities. The pinprick sensation and the joint positional sense were within normal limits. The deep tendon reflexes were normal. Other systems were examined and found to be within normal limits.

Radiographs of the left elbow revealed a collapse of distal humeral articular surface and posteromedial subluxation of the elbow with bony fragments lying in the joint space and some heterotopic ossification in the adjacent tissues (Fig. 1). For the right elbow, comparing with the initial radiographs, the medial condyle collapsed superiorly and there was posterosuperior subluxation of the elbow with some bony fragments within the joint space (Fig. 2). According to the characteristic radiographic features, the preliminary diagnosis was neuropathic arthropathy of both elbows. However, there may be some other possibilities for this condition such as infection, crystal-induced arthritis or tumor. Therefore, synovial biopsy was performed in order to rule out those other possibilities. The biopsy did not reveal any pathogen, abnormal cell or any crystal. Therefore, the most likely diagnosis was neuropathic arthropathy. Some investigations, as shown in Table 1, were performed in order to find the underlying disease that associated with the neuropathic joint.

The patient was given a long-arm splint for seven days, and then range of motion exercises and other physical modalities were permitted. After removal of the splint, the patient did not have any swelling or discomfort. She still had 25-degree hyperextension of the elbow and 140-degree flexion. Although there was gross instability of the elbow, it was fully functional, and she regained the ability to perform her previous normal activities. An elbow brace was advised to provide some stability of the elbow; however, she chose not to use it.

**Case 2**

A 63-year-old male came to see us two years ago with a four-day-long history of fever and mass at
his left elbow. Seventeen years ago, he had had an electric shock and fell to the ground on his left elbow. He went to a hospital and he was given some pills. There was no fracture around the elbow. Since having suffered that injury, he has had a persistent numbness at the elbow and below. He first noticed a painless hard mass at his left elbow and went to see a physician at a hospital. The mass was excised without any complication. He could perform his daily activities as usual without any clinical symptom except for the persisting numbness at the elbow and below. Seven months before coming to our hospital, he fell to the ground on his left hand. He fell some discomfort at his left elbow and noticed a mass at the lateral aspect of his left elbow. He went to the previous hospital and received a biopsy. The operative finding was old seroma with debris of cartilage. The pathologic result was chronic inflammation without any malignant cells. After the operation, the mass remained but there was no other symptom. He could still perform his routine work. Four days ago, he had a fever and the mass grew larger without any pain. He then came to our hospital. He has had diabetic mellitus and ischemic heart disease for 10 years and received medication regularly. Review of other systems was unremarkable.

On physical examination, there were fluctuant swelling and warmness at the medial aspect of the left elbow. Elbow flexion was from 0 to 120 degrees and forearm supination and pronation were 90 and 70 degrees respectively. The left elbow was marked unstable to varus and valgus stress test. Examination of the left hand revealed a decrease in light touch and discriminatory senses in the median and ulnar nerve distributions; weak intrinsic muscles; and grip strength of 12 kg while the right grip was 32 kg. The body temperature was 37.6 degrees Celsius, the white blood cell count was 15100/cumm with polymorphs 82% and the ESR was 99 mm/h. Radiographs revealed a collapsed distal humeral articular surface, posterior subluxation of the elbow with bone fragments in the joint space and heterotopic ossification in the surrounding soft tissues (Fig. 3). EMG revealed chronic inactive left median and ulnar nerve injuries. Arthrocentesis yielded mixed purulent and unclotted blood of which MSSA grew on culture.

The patient was treated by drainage through a medial incision and 100 ml of purulent fluid was removed from the joint. The articular surface of the

Table 1. Laboratory studies and investigations in patient # 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>11.4 g/dl</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>34.5%</td>
</tr>
<tr>
<td>White blood cell count</td>
<td>6800/cumm</td>
</tr>
<tr>
<td>Polymorphs</td>
<td>47%</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>35%</td>
</tr>
<tr>
<td>Platelets</td>
<td>365000/cumm</td>
</tr>
<tr>
<td>ESR</td>
<td>55 mm/h</td>
</tr>
<tr>
<td>Glucose</td>
<td>93 mg/dl</td>
</tr>
<tr>
<td>BUN</td>
<td>22 mg/dl</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.1 mg/dl</td>
</tr>
<tr>
<td>Sodium</td>
<td>141 mmol/l</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.4 mmol/l</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>28 mmol/l</td>
</tr>
<tr>
<td>Chloride</td>
<td>104 mmol/l</td>
</tr>
<tr>
<td>VDRL</td>
<td>non-reactive</td>
</tr>
<tr>
<td>EMG</td>
<td>no evidence of peripheral or nerve root injury in both sides</td>
</tr>
<tr>
<td>MRI whole spine</td>
<td>no syringomyelia, generalized degenerative changes of the spine</td>
</tr>
</tbody>
</table>
distal humerus and proximal ulna and radius were destroyed. There were numerous fragments of bone and irregular pieces of rubbery grayish white tissue in the joint cavity. The joint was irrigated with normal saline solution and antiseptic solution. A rubber penrose drain was inserted into the joint cavity. The wound was then dressed and a posterior long arm slab was applied. The patient was given cloxacillin intravenously every day. Two weeks after the surgical procedure, there still was continuous serous discharge from the joint. The elbow was redebrided. An external fixator was applied from the humeral shaft to the shaft of ulna (Fig. 4), and the patient was given antibiotics intravenously for 4 weeks and orally thereafter. After the second operation, the swelling and inflammation at the elbow resolved rapidly. Four weeks after the operation, the patient was discharged from the hospital and was treated with antibiotics for six more weeks.

The external fixator was removed 13 weeks after the second operative procedure. The patient has been followed-up for two years and there have been no clinical or laboratory signs of infection and no recurrent drainage. On the most recent examination, he had no limitation of joint motion but some instability to valgus and varus stress test. Despite the instability of the joint, the function of the elbow was quite good.

Discussion

Neuropathic arthropathy of the elbow is a rare condition. From reviewing the literature, there are approximately 3-8% elbow neuropathic arthropathy out of all the cases of neuropathic joints\(^5\,^6\). Most of the documents reported only one or two cases except the study of Carl that reported five cases of neuropathic arthropathy of the elbow\(^4\). Although there is no unanimous agreement on the etiology and pathogenesis of the neuropathic joint, the current consensus supports the prominent role of misuse or abuse of insensitive joints in this condition. Loss of pain and proprioceptive sensations leads to relaxation of the soft tissue structures around the joints and this, in turn, leads to injury, malalignment and abnormal loading of the joints even with normal physiological loads of daily activities. Cumulative injury leads to progressive degeneration and disorganization of the articulation.

The pathologic and radiographic features of advanced neuropathic arthropathy are indeed characteristic, the “5Ds” which come from debris, density (sclerosis), destruction, disorganization and dislocation. The radiographic findings can be divided into two forms, hypertrophic or productive and atrophic or destructive. Hypertrophic changes are commonly associated with central spinal cord lesions such as trauma, tumor or congenital malformation whereas atrophic changes are associated with peripheral nerve injuries and are related to trauma, alcoholism and diabetes mellitus\(^4\). Some authors have emphasized the difference between these two forms of the disease\(^5\,^8\,^9\); however, other authors have suggested that the hypertrophic and atrophic forms of neuropathic joints are only different stages in the natural progression of the disease\(^10\). Although the radiographic and pathologic features of this condition are generally similar in
these various disorders, the distribution of the abnormalities varies among the disorders and can provide an important clue for a proper specific diagnosis as shown in Table 2. Specifically focused on neuropathic arthropathy of the elbow, a variety of diseases has been reported in the literature as shown in Table 3. Neuropathic arthropathy of the elbow is most often associated with syringomyelia and tabes dorsalis.

Patients with a neuropathic joint may present with a joint effusion and may report a history of injury recently or in the distant past. Although it is classically described as painless lesion in neuropathic joint, one-third of the patients can have pain. Our patient, the non-infected case, has neuropathic arthropathy of the elbow that was diagnostically shown in radiographic pictures. Although she was presented with mild pain at the medial aspect of the left elbow, there was no significant trauma in that area recently and she did not have any pain before. After a conservative treatment with rest, elevation and immobilization, the pain was resolved and she could return to her previous normal activities. She underwent many investigations in order to find the underlying disease that produced neuropathic arthropathy of the elbow, but there was no positive result. She had a history of trauma to both elbows, the first time was three years ago at the left side, she was treated with immobilization for one week and the symptoms subsided. Therefore, we can imply from this history that the trauma was not severe enough to produce the features shown in the radiographs. For the right elbow that was diagnosed as medial epicondylar fracture 2 years ago, the recent radiographic picture differed from the previous radiographs, showing a bony pathology at that elbow. Therefore, the diagnosis in this patient is idiopathic neuropathic arthropathy of both elbows. In all cases, the treatment of neuropathic joint remain the same and is aimed at slowing down and minimizing the degree of joint pathology while retaining the function of the joint. The treatment can be divided into conservative and surgical treatment. Generally, surgery is considered only after all conservative measures have failed and the integrity of the soft tissue surrounding the joint is threatened. Additionally, surgery should be undertaken only when late stage of deformity is evident and conservative measures are inevitably useless.

Hatzis et al. reported successful treatment of mobilization instead of immobilization in neuropathic arthropathy of the shoulder. From Carl et al. series, four out of five patients with neuropathic arthropathy of the elbow were successfully treated without immobilization of the elbow, but instead they were encouraged to use it. Our patient was treated with immobilization only until the pain subsided.

Both of our patients (the non-infected case and the case that the infection was successfully treated) had instability of the elbow, but they demonstrated remarkable maintenance of functional elbow motion. In spite of continued subluxation, that is instability to varus and valgus, the patients were satisfied with their elbow function. This may be that the pain and apprehension, the usual symptoms associated with elbow instability, was masked by the underlying

Table 2. Common sites of involvement in neuropathic arthropathy

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Sites of Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tabes dorsalis</td>
<td>Knee, hip, ankle, spine</td>
</tr>
<tr>
<td>Syringomyelia</td>
<td>Glenohumeral joint, elbow, wrist, spine</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Metatarsophalangeal, tarsometatarsal, intertarsal joints</td>
</tr>
<tr>
<td>Alcoholism</td>
<td>Metatarsophalangeal, interphalangeal joints</td>
</tr>
<tr>
<td>Amyloidosis</td>
<td>Knee, ankle</td>
</tr>
<tr>
<td>Meningomyelocle</td>
<td>Ankle, intertarsal joints</td>
</tr>
<tr>
<td>Congenital sensory neuropathy</td>
<td>Knee, ankle, intertarsal, metatarsophalangeal, interphalangeal joints</td>
</tr>
<tr>
<td>hereditary sensory radicular neuropathy</td>
<td></td>
</tr>
<tr>
<td>Idiopathic</td>
<td>Elbow, shoulder</td>
</tr>
</tbody>
</table>

Table 3. Some causes of neuropathic arthropathy of the elbow

- Syringomyelia
- Tabes dorsalis
- Peripheral neuropathy
- Diabetes mellitus
- Syringohydromyelia
- Charcot-Marie-Tooth disease
- Congenital insensitivity to pain
- Systemic sclerosis
- Surgical denervation
- Idiopathic
disease. In addition, comparing to the natural history of neuropathic joint of lower extremities, the progress of the disease of elbow may stabilize and the elbow function maintained because of the lower loading force at the elbow.

Cases of septic arthritis complicating a neuropathic joint have been reported even less frequently and a review of pertinent literature revealed less than 10 cases in addition to those reported here. Table 4 summarizes the well-described cases of infected neuropathic joints in the English-language literature.

The diagnosis of joint infection in patients with neuropathic joints is difficult and needs careful surveillance as the usual clue of pain is lacking so that sepsis in a partially or totally anesthetized joint may be overlooked. Effusion can be missed in a distorted, hypertrophic joint. Thus, fever may be the only clue to alert the physician to become aware of this condition.

Successful treatment of patients with septic arthritis including those with infected neuropathic joints requires appropriate parenteral antibiotic therapy and drainage of the joint. The most common organisms found in the infected neuropathic joint are gram-positive cocci. Controversy still exists over the preferred method of initial drainage. Goldenberg et al(21) and Rubinow et al(19) suggested that repeated needle aspirations utilizing synovial fluid analysis as an indicator of therapeutic response is the initial treatment of choice. Surgical drainage is advised for loculated, grossly purulent parts of the joint. On the other hand, others advocated that initial operative treatment bring about healing of the infectious process without subjecting the patient to multiple aspirations(22,23). However, sometimes bacteria were resistant to antibiotic treatment even with appropriate surgical debridement, and amputation or wide resection may be needed(20).

The authors suggest that infection in a neuropathic joint be drained initially by surgical drainage. The case received surgical drainage initially but immobilization method (posterior long arm slab) was not stable enough. After an external fixator had been placed, the infection resolved rapidly. From this information, the authors implied that in addition to surgical drainage and systemic antibiotic, an appropriate immobilization measure is needed while the infectious process is being healed.

**Conclusion**

Neuropathic arthropathy of the elbow is a rare condition. If neuropathic arthropathy is found in the elbow as diagnosed from radiographic pictures, the underlying disease should be sought out. In case of septic arthritis, the treatment is difficult. In addition to systemic antibiotic and surgical debridement, appropriate immobilization during the healing process is necessary. The patients had gross instability of the elbow, they demonstrate remarkably good elbow function with non-operative treatment.

**References**


---

**Table 4. Summary of reported case of infected neuropathic joints with English-language literature**

<table>
<thead>
<tr>
<th>No. of patients</th>
<th>Location</th>
<th>Etiology</th>
<th>Bacteria</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin, et al173</td>
<td>4 Knee</td>
<td>Tabes dorsalis</td>
<td>S. aureus</td>
<td>Surgical drainage and systemic antibiotics</td>
</tr>
<tr>
<td>Ward, et al18</td>
<td>1 Wrist</td>
<td>Syringomyelia</td>
<td>Pseudomonas arruginosa</td>
<td>Surgical drainage and systemic antibiotics</td>
</tr>
<tr>
<td>Rubinow, et al19</td>
<td>2 Shoulder</td>
<td>Syringomyelia</td>
<td>S. aureus</td>
<td>Multiple aspiration and systemic antibiotics</td>
</tr>
<tr>
<td>Goodman, et al20</td>
<td>1 Shoulder</td>
<td>Congenital insensitivity to pain</td>
<td>Beta-hemolytic streptoccci</td>
<td>Surgical drainage and systemic antibiotics</td>
</tr>
</tbody>
</table>

The authors suggest that infection in a neuropathic joint be drained initially by surgical drainage. The case received surgical drainage initially but immobilization method (posterior long arm slab) was not stable enough. After an external fixator had been placed, the infection resolved rapidly. From this information, the authors implied that in addition to surgical drainage and systemic antibiotic, an appropriate immobilization measure is needed while the infectious process is being healed.

---

**References**


รายงานผู้ป่วย 2 รายที่มีภาวะข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาท

อาชีศ อุณณานันท์, สารเนตร ไวคุก

บทนำ: ภาวะข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาทเป็นภาวะที่พบบ่อย โดยจะเกิดกับข้อต่าง ๆ ในร่างกาย เช่นข้อเข่า, ข้อไหล่ เป็นต้น สำหรับข้อศอกจัดเป็นข้อต่อที่มักมีความไม่สมบูรณ์มาก โดยทั่วไปผู้ป่วยที่มีภาวะนี้จะมีความไม่สมบูรณ์ของข้อหนัง ๆ มาก โดยที่ผู้ป่วยมีความเจ็บปวดน้อยหรือไม่เจ็บปวดเลย สำหรับการคิดเชื่อในภาวะข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาทนั้น การรายงานจำนวนรายที่มีภาวะนี้ไม่ได้รายงานอยู่ 2 รายซึ่งมีภาวะข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาทและหนึ่งรายที่มีภาวะอักเสบ รวมถึง

วัสดุและวิธีการ: ผู้ป่วย 2 รายที่ได้รับการวินิจฉัยว่าเป็นข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาทได้ทำการรักษาที่โรงพยาบาลศิริราช ผู้ป่วยทั้ง 2 รายมีอายุมากกว่า 60 ปี โดยที่ผู้ป่วยทั้ง 2 รายได้รับการวินิจฉัยว่าเป็นข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาทที่หน้าผากกลาง (medial) และ ulnar ถ้าที่ผู้ป่วยทั้ง 2 รายมีอาการเจ็บปวดน้อยและมีการมีอาการประสงค์ในการกระทำด้วยคู่มือ ผู้ป่วยทั้ง 2 รายมีการมีอาการเจ็บปวดน้อยและมีการมีอาการประสงค์ในการกระทำด้วยคู่มือ

วัสดุและวิธีการ: ผู้ป่วยทั้ง 2 รายได้รับการวินิจฉัยว่าเป็นข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาท และ')).

ผลการศึกษา: ผู้ป่วยทั้ง 2 รายมีอาการเจ็บปวดน้อยและมีการมีอาการประสงค์ในการกระทำด้วยคู่มือ ผู้ป่วยทั้ง 2 รายมีอาการเจ็บปวดน้อยและมีการมีอาการประสงค์ในการกระทำด้วยคู่มือ

สรุป: ภาวะข้อเศื่อมจากความไม่สมบูรณ์ของระบบประสาทเป็นภาวะที่พบบ่อย ผู้ป่วยทั้ง 2 รายมีอาการเจ็บปวดน้อยและมีการมีอาการประสงค์ในการกระทำด้วยคู่มือ