# Trauma and psoriatic arthritis

## *Is there a relationship?*

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There have been reported cases of onset or exacerbation of inflammatory arthritis following traumatic events.[1-11] In this type of situation there is always uncertainty as to whether the trauma was truly the inciting event or whether the timing was merely coincidental. In the event of a workplace injury and subsequent development of inflammatory arthritis, physicians might be asked to formally address causal relationships in reference to claims to the Workers' Compensation Board (WCB) or other compensatory financial institutions. In this report we relate a further case study of exacerbation of psoriatic arthritis following a traumatic injury and review the literature addressing this potential association.

## Case

A 39-year-old man with a 14-year history of seronegative inflammatory polyarthritis was diagnosed with psoriatic arthritis. His test results were negative for the human leukocyte antigen B27 (HLA-B27). He had long-standing dactylitic involvement of the third and fourth left digits, and occasionally observed swelling of the fourth right metacarpophalangeal joint. He had been treated over time with nonsteroidal anti-inflammatory drugs, sulfasalazine, and methotrexate. He did have occasional self-determined interruptions in his pharmacotherapy and periodically had transient inflammatory flares in other regions, including dactylitic involvement in his toes, ankle swelling, and knee effusions. However, his disease had been quite stable with the use of methotrexate for some time. Between October and November of 2009 the patient discontinued taking all medications. His rheumatology follow-up visit in March 2010 documented no new joint swelling on physical examination and specifically no joint or digit swelling on the right hand.

In late July 2010 he suffered a crush injury to his right hand during the course of his work as a house painter. His hand, particularly the third digit and to a lesser extent the fourth digit, became swollen, erythematous, and painful (**Figure 1**). Radiographs taken immediately after the injury did not demonstrate any fracture or bony abnormality. Magnetic resonance imaging of the third digit, which was taken 2 months after the injury, demonstrated changes consistent with dactylitis, bone marrow edema, and third-digit flexor tenosynovitis (**Figure 2**). The digital swelling and discomfort persisted with decreased ability to flex the digits. In October 2010 the patient returned to the rheumatology clinic for follow-up. Radiographs taken during this visit demonstrated soft tissue swelling of the third digit and erosive changes of the fourth proximal interphalangeal joint (**Figure 3**). His C-reactive protein level was elevated at 10.2 mg/L. Although initially the patient had been reluctant to consider further pharmacotherapy, at this point he consented to reinitiation of methotrexate and nonsteroidal anti-inflammatory drug therapy. In January 2011 repeat magnetic resonance imaging revealed persistent bone marrow edema, soft tissue edema, synovitis, and early erosions in the third proximal phalanx at the proximal interphalangeal joint not yet visible on radiograph (**Figure 4**).

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### EDITOR'S KEY POINTS

- Although there is evidence for scientific rationale behind the proposed association between trauma and onset or exacerbation of psoriatic arthritis, and case reports have suggested a causal link, case-control studies have not been in agreement on this question. This ambiguity in the literature makes it more challenging for physicians in workplace injury claim situations to provide just evaluation of given clinical circumstances.
- In such workplace injuries, the following criteria might be helpful: single and significant trauma; absence of joint lesions before trauma; localization of arthritis in the area of trauma; and absence of delay or short delay between trauma and onset of arthritis.

### POINTS DE REPÈRE DU RÉDACTEUR

- Bien qu'il y ait des données justifiant scientifiquement une association proposée entre un traumatisme et l'apparition ou l'exacerbation de l'arthrite psoriasique, et que des exposés de cas fassent valoir un lien de causalité, les études cas-témoins ne s'entendent pas sur la question. Cette ambiguïté dans la littérature médicale rend difficile pour les médecins d'évaluer de manière exacte des circonstances cliniques données dans les cas de réclamations pour un accident en milieu de travail.
- Dans de tels cas de blessures en milieu de travail, les critères suivants pourraient être utiles: un traumatisme unique important, l'absence de lésions aux articulations avant le traumatisme, la localisation de l'arthrite dans la région affectée par le traumatisme, et l'apparition immédiate de l'arthrite lors du traumatisme ou peu après.

The patient filed a workers' compensation claim, which was subsequently denied. He is appealing this decision.

## Discussion

In the case of our patient, the inflammatory arthritis and dactylitis affecting the right hand developed in temporal proximity to a significant injury. There have been earlier case reports in the English-language literature of posttraumatic development or exacerbation of both seronegative and seropositive inflammatory

**Figure 1. Swollen and erythematous right third digit, with a lesser degree of involvement of the right fourth digit**

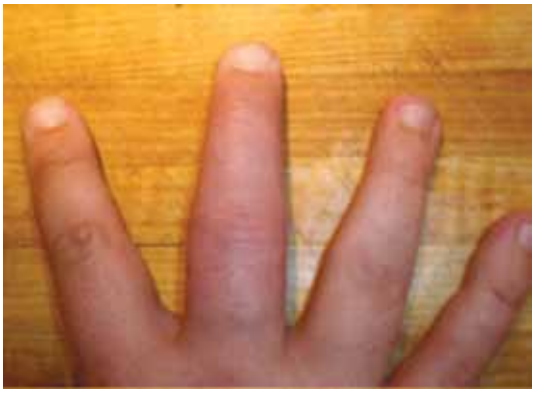


**Figure 3. Radiograph of patient's right hand in October 2010:** *Generalized soft tissue swelling is seen at the third phalanx with no third-digit erosions visible at this time. Erosions (white arrows) are seen at the fourth proximal interphalangeal joint.*

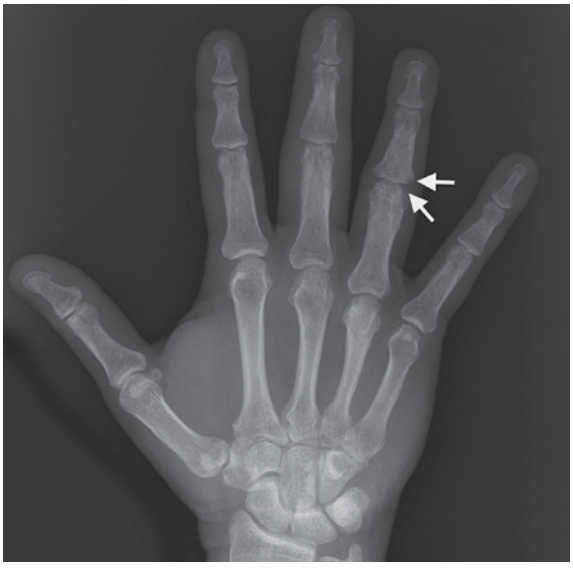
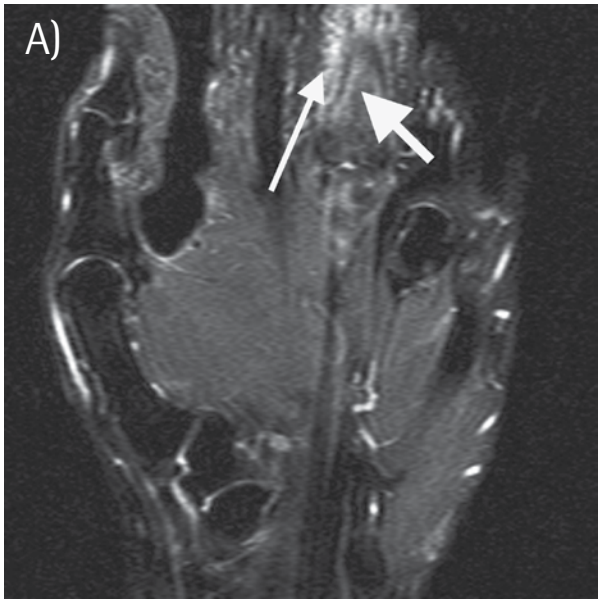


**Figure 2. Magnetic resonance imaging of patient's right hand (obtained with a limited field of view, excluding the proximal interphalangeal and distal interphalangeal joints):** *A) Coronal sequence. Edematous changes in the soft tissues (small white arrow) and proximal phalanx bone marrow (thick white arrow) are seen. B) Axial sequence, with digits labeled. The base of the third proximal phalanx demonstrates fluid signal around the flexor tendons (arrow head), in keeping with tenosynovitis.*



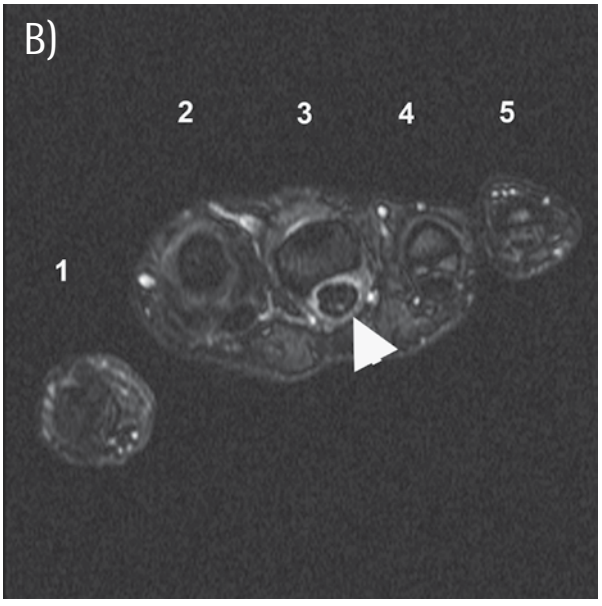
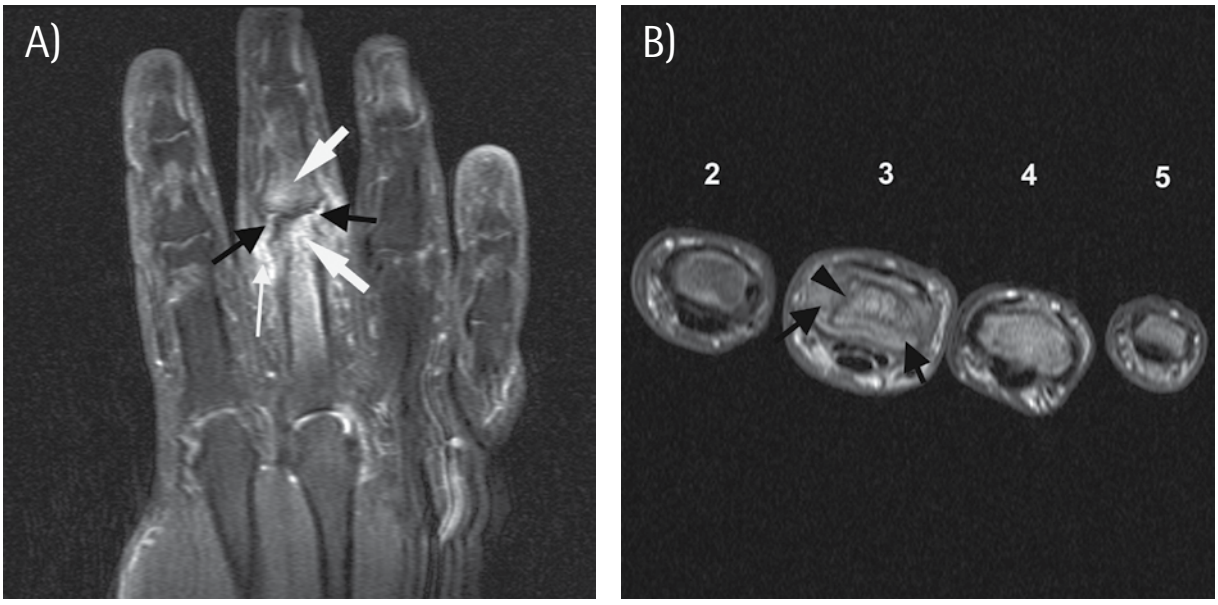



**Figure 4. Magnetic resonance imaging of patient's right fingers in January 2011:** *A) Coronal gadolinium-enhanced image. Bone marrow edema (thick white arrows), synovial enhancement (black arrows), and soft tissue edema (thin white arrow) are found in the third digit. B) Axial gadolinium-enhanced image, with digits labeled. Synovial enhancement (black arrows) and a subtle early erosion (black arrow head), which was not visible on the corresponding x-ray scan (not shown), are found.*




arthropathies, which are summarized in **Table 1**.[1-11] These reports exhibit varying degrees of temporal or physical proximity to the recalled injury. There have also been 2 case studies of patients with psoriatic skin disease who developed terminal acroosteolysis after a local traumatic event affecting the nails but without apparent articular involvement.[12,13] Additionally, there have been several instances of posttraumatic initiation of inflammatory arthropathies reported in the non–English-language literature.[3] These various individual histories are intriguing and assist in generating hypotheses; however, they are insufficient in themselves to unequivocally assign causality.

The cases described in **Table 1**[1-11] include seropositive rheumatoid arthritis, arthropathies associated with HLA-B27 positivity, reactive arthritis, and psoriasis-associated arthritis. Of the 22 cases detailed, 10 were associated with psoriatic or psoriaticlike skin lesions.

The concept of trauma as an inciting event in psoriatic arthritis seems to have originally arisen from the observation in the dermatology population of a Köbner phenomenon, whereby development of psoriatic skin disease has been observed at the sites of significant injury to the dermis and epidermis. It has been proposed that psoriatic arthritis after injury might reflect a "deep-Köbner" effect.[12]

To further evaluate the premise that trauma might be an inciting event in psoriatic arthritis, Scarpa et al undertook a retrospective chart review of the medical records of 138 patients with psoriatic arthritis and 138 patients with rheumatoid arthritis. A preceding acute event was documented in 9% of patients with psoriatic arthritis in the 10 days before onset of joint symptoms, compared with 1% of patients with rheumatoid arthritis. A preceding event was not found to be more common in patients with psoriatic arthritis who had positive HLA-B27 status.[14]

Two recent retrospective case-control studies have been conducted to evaluate frequency of preceding trauma in patients with psoriatic arthritis. Thumboo and colleagues employed the Rochester Epidemiology Project database, securing 60 psoriatic arthritis cases and 120 control patients with psoriasis. *Trauma* was defined as documented motor vehicle accident, fracture, sprain or contusion, surgical procedure, or burn. The time frame extended to 2 years before onset of joint symptoms. There were no significant differences observed in odds ratios for either fractures or all forms of trauma between the psoriatic arthritis cases and the control group.[15] The second case-control study was reported by Pattison et al and examined a UK population of 98 psoriatic arthritis cases and 163 control patients with psoriasis. Patients who developed psoriatic arthritis onset within 5 years of

**Table 1. Case reports of posttraumatic development or exacerbation of both seronegative and seropositive inflammatory arthropathies**

| STUDY | SEX AND AGE | NATURE OF TRAUMA | JOINTS INVOLVED | TIME BETWEEN TRAUMA AND ONSET OF CLINICAL FEATURES | LABORATORY RESULTS, ABNORMALITIES, AND ASSOCIATED FEATURES |
|---|---|---|---|---|---|
| Williams and Scott (1967)[1] | Man, aged 31 y | Hit third left finger while planing wood | Third left PIP joint | Immediate swelling of third left PIP joint; 1 y later erosive polyarthritis | Positive Rose-Waaler test results, rheumatoid nodule |
| Williams and Scott (1967)[1] | Man, aged 51 y | Hit third right finger while sawing wood | Third right PIP joint | Persistent swelling several wk later; then 3 mo later polyarthritis developed | Positive Rose-Waaler test results |
| Williams and Scott (1967)[1] | Woman, aged 54 y | Hit second and third right fingers with pliers | Second and third right PIP joints | Immediate involvement of second right PIP joint; 2 mo later third right PIP joint involved | Scalp psoriasis, elevated ESR |
| Wisnieski (1984)[2] | Man, aged 23 y | Struck knee while rock climbing | Right knee | 7 d | Negative RF test results, positive HLA-B27 test results, elevated ESR |
| Wisnieski (1984)[2] | Man, aged 55 y | Had contusions from MVA | Knees, wrists, ankles | Onset 3 wk after MVA; episodic over next 35 y | Keratoderma blennorrhagica, positive HLA-B27 test results, elevated ESR, possible psoriasis |
| Masson et al (1985)[3] | Man, aged 28 y | Experienced trauma to base of spine at L5, metacarpal | Hand, spine, sacroiliac joints | 2 d of hand swelling; 10 d later neck and lower thoracic inflammatory symptoms; 30 d later sacroiliitis | Urethritis, positive HLA-B27 test results, scintigraphy confirmed bilateral sacroiliitis |
| Masson et al (1985)[3] | Man, aged 21 y | Experienced multiple fractures from MVA | Left knee, both hips; later multiple other joints and sacroiliitis | Knees and hips involved within 3 mo; other sites within 4 mo | Elevated ESR, x-ray scan showed sacroiliitis, positive HLA-B27 test results |
| Masson et al (1985)[3] | Man, aged 24 y | Had slight injury to right wrist | Right wrist, both knees, cervical spine | 15 d for wrist; other joints involved within 21 d | Conjunctivitis, elevated ESR, positive HLA-B27 test results |
| Olivieri et al (1988)[4] | Girl, aged 13 y | Fell during a race, striking the right hip | Right hip, both ankles, left elbow | 3 d | Elevated CRP, positive HLA-B27 test results, rapid progressive loss of right hip joint space, erosions seen |
| Olivieri et al (1988)[4] | Woman, aged 25 y | Struck by falling bookcase and had multiple contusions | Sacroiliac joints, right hip, lumbar spine | Immediate, but worsening over 2 mo to time of assessment | Elevated ESR and CRP, positive HLA-B27 test results, substantial right hip erosive damage at 2 mo |
| Olivieri et al (1989)[5] | Man, aged 41 y | Ran over by car and had hand surgery | Knee effusions | ≥5 d | Elevated ESR, negative test results for RF and ANA, diarrhea, fever, urethritis concurrent with knee arthritis |
| Olivieri et al (1989)[5] | Man, aged 25 y | Landed on extended knees after parachute jump | Knees | Same day, resolved after 2 IA corticosteroid injections | Elevated ESR, positive HLA-B27 test results, negative test results for RF and ANA |
| Langevitz et al (1990)[6] | Woman, aged 40 y | Fell on outstretched hand | Left wrist | 3 y | Negative test results for HLA-B27, RF, and ANA; developed psoriasis in interval |
| Goupille et al (1991)[7] | Man, aged 58 y | Fell on right shoulder | Right knee initially, 2 mo later both knees, feet, and wrists | Right knee pain and swelling developed 1 wk after injury | Conjunctivitis, psoriasis developed postinjury, elevated CRP, ESR, CSF, and WBC count |
| Olivieri et al (1991)[8] | Woman, aged 20 y | Had MVA | Right SC joint | Immediate | Psoriasis, elevated ESR and CRP, positive HLA-B27 test results |
| Doury (1993)[9] | Man, aged 45 y | Fell on knees | Knees | Knees immediately involved; polyarthritis developed after 1 mo | Psoriasis developed postinjury on knee, elevated ESR, negative HLA-B27 test results |
| Sandorfi and Freundlich (1997)[10] | Woman, aged 30 y | Fell down stairs and injured right ankle | Right ankle, then later left ankle as well | Right ankle immediately involved; left ankle a few wk later; toe dactylitis a few mo later | Psoriasis developed postinjury, negative test results for ANA, RF, and HLA-B27 |
| Sandorfi and Freundlich (1997)[10] | Man, aged 40 y | Slipped and fell while jumping out of a truck | Wrists | Wrists immediately involved and persistently swollen; 4 y later dactylitis and PIP erosions developed | Psoriasis developed at site of injury, conjunctivitis 1 y later, positive test results for ANA and RF |
| Sandorfi and Freundlich (1997)[10] | Man, aged 23 y | Had MVA and injured right hand | Right third digit, persistent swelling | Immediate swelling of right third digit; 3 y later asymmetric PIP and MCP involvement | Psoriasis |
| Sandorfi and Freundlich (1997)[10] | Man, aged 24 y | Fell down stairs and injured lower back | Left sacroiliac joint | Immediate pain; 2 y later MRI showed sacroiliitis | Positive HLA-B27 test results |
| Padula et al (1999)[11] | Man, aged 60 y | Experienced contusive trauma to left hand while chopping wood | Left-hand flexor tenosynovitis, digit dactylitis | 1 wk | Long-standing psoriasis |
| Current case (2012) | Man, aged 39 y | Suffered crush injury of right hand | Third- and fourth-digit dactylitis | Immediate for right third digit; right fourth digit swollen within 2 wk | Negative test results for RF, ANA, and HLA-B27, elevated CRP, psoriasis |

ANA—antinuclear antibody, CRP—C-reactive protein, CSF—cerebrospinal fluid, ESR—erythrocyte sedimentation rate, HLA-B27—human leukocyte antigen–B27, IA—intra-articular, MCP—metacarpophalangeal, MRI—magnetic resonance imaging, MVA—motor vehicle accident, PIP—proximal interphalangeal, RF—rheumatoid factor, SC—sternoclavicular, WBC—white blood cell.

the selected study date were included. *Physical trauma* was defined as documented road traffic accidents, fractures, or other injuries requiring treatment by a general practitioner or at an accident and emergency department in the previous 10 years before the study date. The strongest association was with "trauma leading to medical care," which applied to 14.9% of cases and 7.9% of controls for an odds ratio of 2.53 (95% CI 1.1 to 6.0).[16]

The multifaceted pathogenesis of psoriatic arthritis is an area of ongoing study. Evidence of genetic contribution predisposing to development of arthritis has been found in specific HLA allele associations and in identification of susceptibility genes.[17] Support for a possible dysregulation of the innate immune response, particularly to bacterial antigenic stimulation, has also been reported.[17] In terms of tissue-specific factors, recent persuasive work by McGonagle et al suggests the enthesis might be a key site for initiation of psoriatic arthritis, with enthesitis or osteitis preceding development of adjacent synovitis and joint damage.[18,19] Enthesitis might be provoked by repeated microtrauma from shear and compressive stressing or by a more substantial single injury.

## Conclusion

Although there is evidence for scientific rationale behind the proposed association between trauma and onset or exacerbation of psoriatic arthritis, and there have been case reports suggesting a causal link, case-control studies have not been in agreement on this question. This ambiguity in the literature makes it more challenging for the physician in a WCB claim situation to provide a just evaluation of a given clinical circumstance. In such workplace-related injuries, the "criteria of imputability" referred to by Olivieri might be of use.[20] These criteria include the following: single and significant trauma; absence of joint lesions before trauma; localization of arthritis in the area of trauma; and absence of delay or short delay between trauma and onset of arthritis. Although it is likely that situations will arise in which such criteria will not be completely applicable, these criteria or similarly structured guidelines would be valuable to assist physicians in most posttraumatic psoriatic arthritis assessments.

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**Competing interests**
None declared

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**References**

1. Williams KA, Scott JT. Influence of trauma on the development of chronic inflammatory polyarthritis. *Ann Rheum Dis* 1967;26(6):532-7.
2. Wisnieski JJ. Trauma and Reiter's syndrome: development of 'reactive arthropathy' in two patients following musculoskeletal injury. *Ann Rheum Dis* 1984;43(6):829-32.
3. Masson G, Thomas P, Bontoux D, Alcalay M. Influence of trauma on initiation of Reiter's syndrome and ankylosing spondylitis. *Ann Rheum Dis* 1985;44(12):860-1.
4. Olivieri I, Gherardi S, Bini C, Trippi D, Ciompi ML, Pasero G. Trauma and seronegative spondyloarthropathy: rapid joint destruction in peripheral arthritis triggered by physical injury. *Ann Rheum Dis* 1988;47(1):73-6.
5. Olivieri I, Gemignani G, Christou C, Pasero G. Trauma and seronegative spondyloarthropathy: report of two more cases of peripheral arthritis precipitated by physical injury. *Ann Rheum Dis* 1989;48(6):520-1.
6. Langevitz P, Buskila D, Gladman DD. Psoriatic arthritis precipitated by physical trauma. *J Rheumatol* 1990;17(5):695-7.
7. Goupille P, Soutif D, Valat JP. Psoriatic arthritis precipitated by physical trauma. *J Rheumatol* 1991;18(4):633.
8. Olivieri I, Gemignani G, Christou C, Semeria R, Giustarini S, Pasero G. The triggering role of physical injury in the onset of peripheral arthritis in seronegative spondyloarthropathy. *Rheumatol Int* 1991;10(6):251-3.
9. Doury P. Psoriatic arthritis with physical trauma. *J Rheumatol* 1993;20(9):1629.
10. Sandorfi N, Freundlich B. Psoriatic and seronegative inflammatory arthropathy associated with a traumatic onset: 4 cases and a review of the literature. *J Rheumatol* 1997;24(1):187-92.
11. Padula A, Belsito F, Barozzi L, Cantini F, Salvarani C, Pavlica P, et al. Isolated tenosynovitis associated with psoriasis triggered by physical injury. *Clin Exp Rheumatol* 1999;17(1):103-4.
12. Buckley WR, Raleigh RL. Psoriasis with acro-osteolysis. *N Engl J Med* 1959;261(11):539-41.
13. Miller JL, Soltani K, Tourtellotte CD. Psoriatic acro-osteolysis without arthritis: a case study. *J Bone Joint Surg Am* 1971;53(2):371-4.
14. Scarpa R, Del Puente A, di Girolamo C, della Valle G, Lubrano E, Oriente P. Interplay between environmental factors, articular involvement, and HLA-B27 in patients with psoriatic arthritis. *Ann Rheum Dis* 1992;51(1):78-9.
15. Thumboo J, Uramoto K, Shbeeb MI, O'Fallon WM, Crowson CS, Gibson LE, et al. Risk factors for the development of psoriatic arthritis: a population based nested case control study. *J Rheumatol* 2002;29(4):757-62.
16. Pattison E, Harrison BJ, Griffiths CE, Silman AJ, Bruce IN. Environmental risk factors for the development of psoriatic arthritis: results from a case-control study. *Ann Rheum Dis* 2008;67(5):672-6.
17. Anandarajah AP, Ritchlin CT. Pathogenesis of psoriatic arthritis. *Curr Opin Rheumatol* 2004;16(4):338-43.
18. McGonagle D, Benjamin M, Tan AL. The pathogenesis of psoriatic arthritis and associated nail disease: not autoimmune after all? *Curr Opin Rheumatol* 2009;21(4):340-7.
19. McGonagle D, Ash Z, Dickie L, McDermott M, Aydin SZ. The early phase of psoriatic arthritis. *Ann Rheum Dis* 2011;70(Suppl 1):i71-6.
20. Olivieri I, Padula A, D'Angelo S, Scarpa R. Role of trauma in psoriatic arthritis. *J Rheumatol* 2008;35(11):2085-7.