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RESEARCH ARTICLE

RISK FACTORS FOR HETEROTOPIC OSSIFICATION IN IRAQI SPINAL CORD INJURED PATIENTS.

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Abstract

Background: Heterotopic ossification was known previously as myositis ossificans, and newly called ectopic bone, neurogenic ossifying fibromyopathy, or paraosteoarthritis. All these names refer to new bone formation out of the skeleton in tissues.

Methodology: The study was done in Ibn Al-Kuff rehabilitation hospital in Baghdad between April 1995 and January 1996. patients who were admitted to hospital with early spinal cord injured were included in the study.

Results: Twenty five inpatients forming (group A), their injuries were between (C₄-L₁). Two patients developed heterotopic ossification in both hip joints and one of them developed heterotopic ossification in both knee joints, they were males, their level of injury were D₉ and L₁ consecutively. The time interval between spinal cord injured and heterotopic ossification formation was 4 months in one and 6 months in the other patient. The other 25 spinal cord injured patients with heterotopic ossification (group B) were examined clinically and their notes, reviewed. Their injuries were between (C₅-L₁). The early signs of heterotopic ossification formation, and levels of alkaline phosphatase as recorded in their notes, were similar to (group A) patients.

Conclusion: It is concluded that chest injury fracture, bladder stones are possible risk factors for heterotopic formation.

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Introduction:-

Heterotopic ossification (HO) was known previously as myositis ossificans, and newly called ectopic bone, neurogenic ossifying fibromyopathy, or paraosteoarthritis. All these names refer to new bone formation out of the skeleton in tissues. It was first described by Fay OJ 1914. Its cause is still unknown^(1,2,3).

There are different theories proposed to account for the etiology of HO. These consider such mechanisms as an inductive matrix, chemotactic factors, tissue hypersensitivity, autoimmune response, and genetic factors, including human leukocyte antigens^(2,3,4). Up to date, no substantial support has been found for these theories. HO is one of the complications in spinal cord injured (SCI) patients, brain trauma, other neurologic injuries, burns, and total joint arthroplasty^(3,4).

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The common sites affected by HO in SCI patients are the hip joints^(1,2,3,4,5). Nicholas JJ divided HO into 4 stages⁽³⁾. In the first stage the initial signs are often confused with thrombophlebitis, septic arthritis, cellulitis, or fracture. They include soft tissue swelling, pain, local warmth and erythema near large joint, high serum alkaline phosphatase, and negative radiograms and the swelling is firm to palpation and may cause some limitation of motion at the adjacent joint. In the second stage swelling remains, and continued high alkaline phosphatase levels, and the formation is apparent on the radiogram. The third stage shows initial swelling and erythema subsiding. In the last stage which occurs 2 to 4 weeks after onset, extensive calcification has developed and there may be initial signs of ankyloses of the adjacent joint.

Heterotopic ossification may adversely affect mobility, self-care, activity of daily living, functional independence, and vocational activity. It may also lead to other medical complications; fractures and psychological problems^(5,6). No valid or reliable criteria are available to identify which patterns with SCI are at risk for development of HO.

The objective of this study was to identify predictive factors for Heterotopic ossification and its early identification in Iraqi spinal cord injured patients.

Patients and methods

The study was done in Ibn Al-Kuff rehabilitation hospital in Baghdad between April 1995 and January 1996. Twenty five consecutive SCI patients who were admitted to hospital with early SCI were included in the prospective part of this study (group A), they were followed for 6 months after the date of injury. Another 25 SCI patients with HO (group B) who were attending the outpatient clinic of the same hospital for follow up were examined & studied.

Evaluation of Patients

Medical Information: The following information were obtained from the patients: Their recent medical reports & results, age, sex, cause of injury, level of injury, duration of injury, completeness of injury associated injury, and other complications including HO in (group B).

On Clinical Examination: measurement of range of motion of the upper & lower limbs joints using goniometer & measuring tape. redness, hotness, swelling, pain (in patients with incomplete injury), were checked.

Radiological and laboratory investigations included: Plane X ray of pelvis for all patients and to the other joints when it is expected to be involved, Complete blood picture and ESR, general urine exam., blood urea, serum creatinine, serum alkaline phosphatase (normal value 3-13 K.A.U), S. calcium (normal value 8.5-10.5 mg/dl) serum phosphorus (normal value 2.5-4.5 mg/dl). These three last investigations were done for inpatients (group A). Other investigations are like hydroxy-prolin, s. lactic acid, bone scan, bone isotopes, ultrasound, venogram, dopplar test, were not done due to sanction circumstances.

Statistical Analysis: The data were grouped and analyzed, using the Z test to find the significance. P-value of 0.05 and less was considered as significance

Results:-

Fifty patients with SCI were included in this study. Twenty five (22 male, 3 female) patients were inpatients (group A). Their injuries were between (C₄ – L₁). Two patients developed HO in both hip joints and one of them developed HO in both knee joints, they were males, their level of injury were D₉ and L₁ consecutively. The time interval between SCI and HO formation was 4 months in one and 6 months in the other patient. The early signs of HO were redness, hotness, swelling, and decreased range of motion of the joint near by the affected area. The serum alkaline phosphatase was elevated after the clinical manifestation by 1-2 weeks in both patients, radiographic changes were noted 2-3 weeks after clinical signs appeared in both patients. Serum calcium & phosphate showed no changes during elevation of s. alkaline ph. and during the period HO formation.

The other 25 SCI patients with HO (group B) were examined clinically and their notes, reviewed. They were all males and their injuries between (C₅ – L₁). The early signs of HO formation, and levels of Alkaline Phosphatase (AP) as recorded in their notes, were similar to (group A) patients. The roentgenographic findings were also detected 2-3 weeks after clinical manifestations as in (group A). The serum calcium & phosphorus were not raised during the elevation of serum AP or period of HO formation as in (group A).

The causes of injury and level of SCI patients (both groups) are shown in table (1). The serum alkaline phosphatase levels relation to time is shown in fig. (1). The proposed risk factors in the patients are shown in table (2), which shows significantly more chest injuries, fractures & bladder stones in HO patients compared to non HO patients ($P < 0.05$).

Table 1:-causes, level and neurological state of spinal cord injury in both groups patients

	Group A	Group B
Cause:		
Gunshot (shell, bullet)	12	18
R.T.A	9	5
Trauma	4	2
Level:		
Cervical	6	4
Dorsal	16	20
Lumber	3	1
Neurological state		
Spastic		
Complete	10	16
Incomplete	5	4
Flaccid:		
Complete	9	5
Incomplete	1	-

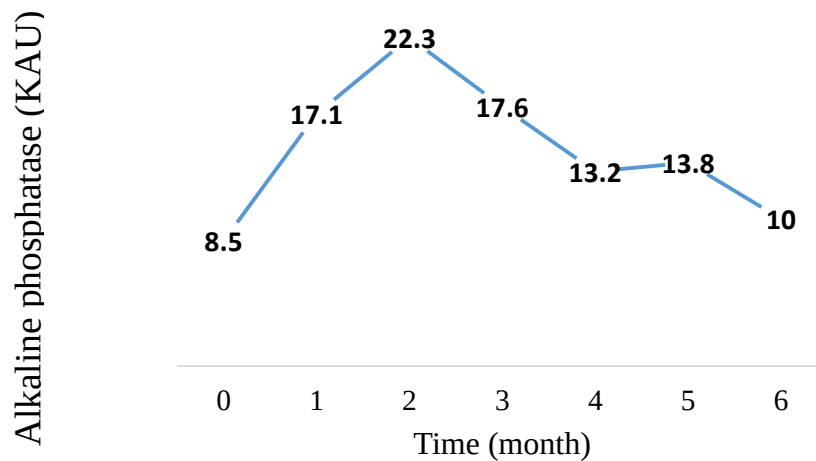


Fig. 1:-Relationship between alkaline phosphatase during heterotopic ossification formation and time

Table 2:-Proposed risk in development of heterotopic ossification in group A and group B spinal cord injured patients

	Group A		Group B	
	Patients No.	(Percent)	Patients No.	(Percent)
HO	2	(8)	25	(100)
Chest injury*	5	(20)	12*	(48)
Fracture skeleton ⁺⁺	8	(32)	15 ⁺⁺	(60)
Bladder stone	Zero	(0)	6 [^]	(24)
Spasticity	15	(6)	20	(80)

Pressure sore	17	(68)	21	(84)
Complete lesion	19	(76)	22	(88)
D.V.T.	6	(24)	6	(24)

*++ P < 0.05

^ P > 0.01

Discussion:-

The incidence of HO formation in group (A) patients was 8%, this low level is due to the short duration of follow up in our patients, compared to (16-53%) in patients followed for 12 months to 4 years in other studies ^(1,6).

The clinical signs of HO formation were redness, hotness, swelling, decreased range of motion in the joint near by the lesion, as reported in the two patients developed HO in group A. All these manifestations were similar to other series ^(3,4,6). Serum Alk. Phos. level was elevated after onset of clinical signs by 1-2 weeks in this study, a finding which was seen in other studies ^(5,6,7). Roentgenogram findings were detected 2-3 weeks after onset, the same period mentioned by others ^(4,5,6,7,8). The positive correlation between chest injuries, fractures, bladder stones and HO formation was recorded in our patients and not in other series.

The relation of spasticity & completeness of lesion to HO was similar between our patients and other study ⁽¹⁾.

Eighty-four percent of group B patients had pressure sores, while another study ⁽¹⁾ reported pressure sores in 74% of patients with HO.

The age shows no role in HO formation in our study while in other study ⁽¹⁾ older age is considered as a risk factor in HO formation. It is concluded that chest injury fracture, bladder stones are possible risk factors for HO formation.

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