ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: www.ijmacr.com

Volume – 5, Issue – 2, March - April - 2022, Page No. : 07 – 12

RFT, S. electrolyte, LFT changes in heterotrophic ossification following traumatic brain injury- A prospective study

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How to citation this article: Dr. Raja Yadav, Dr. Anil Baduke, Dr. Rohit Bansal, Dr. Devendra Patkar, Dr. S. Gaur, "RFT, S. electrolyte, LFT changes in heterotrophic ossification following traumatic brain injury, A prospective study", IJMACR- March - April - 2022, Vol – 5, Issue - 2, P. No. 07 – 12.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Heterotopic ossification (HO) is a pathologic process, as there is formation of extra skeletal bone in muscle and soft tissues where bone physiologically does not exists.

Risk factors include concomitant male Gender, history of heterotrophic ossification, polytrauma, infection, ankylosing spondylitis, spondylitis, diffuse idiopathic skeletal hyperostosis and blast injuries.

Aims and objectives: To access changes in serum electrolyte, liver function test, renal function test in heterotrophic ossification following traumatic brain.

Observations: In present study, there was a significant change observed in terms of serum calcium which was significantly decreased from 7.83 from baseline to 7.71 at 3 months and thereafter to 8.96 at the end of 6 months of follow up (P=0.04).

On comparing the liver function test parameters, it was found that we observed a significant change in all the liver function test parameters. Mean SGOT was significantly decreased from 33.92 at baseline to 21.71 at the end of 6 months (P=0.022). Similarly mean SGPT was also significantly decreased to 16.33 at the end of 6 months from 29.33 from baseline (P=0.009). Mean value of SAP was significantly decreased from 344.75 (baseline) to 305.17 (3 months) to 206.17 (at the end of 6 months (P<0.001)

Conclusions: There was a significant change observed in terms of serum calcium and liver function test parameters which were followed at 0,3,6-month intervals

Keywords: Heterotropic ossifications, traumatic head injury, serum calcium, liver function teat.

Introduction

Heterotopic ossification (HO) is a pathologic process, as there is formation of extra skeletal bone in muscle and soft tissues where bone physiologically does not exist. The word "heterotopic" is comes from the Greek roots

"hetero" and "topos," that means "other place." It is a complication of numerous types of trauma, surgeries around (hip, knee elbow etc), electrical injury, neurological injuries and thermal injuries. The most affected joints are the hips (60%-70%) and knees (20%-30%). (Hernandez AM et al, 1978)1 The clinical signs and symptoms of HO may include pain, stiffness, loss of joint range of motion (ROM), swelling or warmth of joint area, fever, increased spasticity, joint pain, muscle pain, and autonomic dysreflexia and functional impairments. Several studies have investigated HO once hip trauma or replacement surgery. It appear as early as 3 wk or as late as 12 wk after the musculoskeletal trauma, spinal cord injury, or other presenting events. (B.E. Eller in et al, 1999)[2].

Risk factors including concomitant male gender, history of heterotrophic ossification, polytrauma, infection, ankylosing spondylitis, spondylitis, diffuse idiopathic skeletal hyperostosis and blast injuries, Surgical technique may play a role in development of heterotrophic ossification, anterior and anterolateral approach carry a higher risk of heterotrophic ossification than trans trochanteric and posterior approach The incidence of HO in hip surgery can be totally different in several ethnic groups. Additionally, close to 20% of patients with spinal cord injuries and traumatic brain injuries develop HO. (Bossche LV et al, 2005)3 Once the diagnosis of early HO is confirmed, passive range-of-motion exercises to maintain joint mobility are recommended. More aggressive joint manipulation has been suggested, although the trauma resulting from this approach carries the risk of inciting further HO. (Stover SL et al, 1975)[4] Biphosphonates and nonsteroidal anti-inflammatory medications (such as indomethacin and ibuprofen) have been used for the prophylaxis or treatment of HO. Radiation therapy has conjointly with success been used to prevent or treat HO. (Neal BC et al, 2000)[5]. Preoperative and post operative radiation regimens with doses as low as 500cGy are successful The currently available treatments are still highly controversial. Recent studies have shown a good effect of active and passive exercising of joints within the pain-free range. (Van Kuijk AA et al, 2002)[6]

Aims and Objectives

To access changes in serum electrolyte, liver function test, renal function test in heterotrophic ossification following traumatic brain

Materials and methods

- Type of study: Prospective Observational, Cross Sectional and Hospital Based Study
- Study place: Department of orthopaedic and traumatology, Gandhi Medical College, & associated Hospitals (Hamidia Hospital) Bhopal.
- Study duration**:** Data was collected from 2017 to 2020.
- Sample size: 24 Patients were taken of which 15 are male and 9 are female patients
- Patients who were treated for a traumatic brain injury in our hospital, and who subsequently developed HO, were identified
- All patients were followed up, either as part of their in-hospital stay or during their follow-up visits.

Inclusion criteria

- Age more than 18 years with traumatic brain injury
- Patients giving the written consent for the study

Exclusion criteria

- Patients with nontraumatic brain injury and patients younger than 18 years were excluded from the study
- Patients with previous history of major surgery.

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Investigations

- X Rays (pre op, post op, at 3 month and 6-month interval)
- Serum Bilirubin, SGPT, SGOT, Alkaline Phosphate
- Cretinine, urea, albumin, uric acid
- Ca, K, Na, HCo3

Follow up

All patients were followed up clinically, radiologically and biochemically at an interval of 3 month, 6 month, and result was assessed in terms of changes in RFT, S. electrolyte, LFT parameters.

Figure 1: X ray at time of trauma

Figure 2: At 3 month follow up

Figure 3: At 6 month follow up

Observations

Table 1

RFT	Follow up (months)	Mean	Std. Deviation	P value
Creatinine	0	1.17	0.565	0.260
	3	1.04	.359	
	6	.96	.359	
Urea	0	4.88	2.740	0.499
	3	4.29	2.386	

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	6	5.08	2.020	
Albumin	0	3.75	1.422	0.731
	3	3.54	.779	
	6	3.54	.658	
Uric acid	0	6.00	2.735	0.488
	3	6.96	2.579	
	6	6.42	2.962	

Table 2

S. electrolyte	Follow Up (months)	Mean	Std. Deviation	P value
S. Po4	0	3.68	1.465	0.744
	3	3.47	.779	
	6	3.68	.868	
Ca^{2+}	0	7.84	1.494	0.004
	3	7.72	1.756	
	6	8.97	.690	
K^{+}	0	4.43	1.018	0.776
	3	4.34	.761	
	6	4.51	.590	
Na^{+}	0	138.30	4.448	0.306
	3	134.55	21.950	
	6	140.34	3.807	
HCO3	0	23.43	2.185	0.510
	3	23.05	1.654	
	6	22.80	1.719	

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Table 3

LFT	Follow up (months)	Mean	Std. Deviation	P value
SGOT	0	33.92	19.213	0.022
	3	25.00	10.742	
	6	21.71	15.138	
SGPT	0	29.33	19.466	0.009
	3	18.63	12.676	
	6	16.33	12.200	
SAP	0	344.75	125.412	<0.001
	3	305.17	96.412	
	6	206.17	101.940	

Summary

In present study Heterotrophic ossification was more prevalent in the age between 31-40 years (45.83%) followed by 41-50 years (20.83%) and 10-20 years (16.67%). This means a major proportion of the patients in present study was young and belong to working age group.

In Present study, male preponderance was reported in Heterotrophic ossification with 60% of the patients being males.

In Present study, most common mode of injury was road traffic accidents (95.83%).

No significant difference was observed in serum creatinine, urea, blood albumin and uric acid levels during follow up as compared to baseline as reveled by the insignificant p value of >0.05 for all the parameters

In present study, there was a significant change observed in terms of serum calcium which was significantly decreased from 7.83 from baseline to 7.71 at 3 months and thereafter to 8.96 at the end of 6 months of follow up (p=0.04). However other laboratory parameters like serum potassium, serum sodium, HCO3 and SPo4 were similar across all the follow up as compared to baseline values.

On comparing the liver function test parameters, it was found that we observed a significant change in all the liver function test parameters. Mean SGOT was significantly decreased from 33.92 at baseline to 21.71 at the end of 6 months (p=0.022). Similarly mean SGPT was also significantly decreased to 16.33 at the end of 6 months from 29.33 from baseline (p=0.009). Mean value of SAP was significantly decreased from 344.75 (baseline) to 305.17 (3 months) to 206.17 (at the end of 6 months (p<0.001).

Conclusion

In the present study no significant difference was observed in serum creatinine, urea, blood albumin and uric acid levels during follow up as compared to baseline as reveled by the insignificant p value of >0.05 for all the parameters.

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There was a significant change observed in terms of serum calcium which was significantly increased from 7.83 from baseline to 7.71 at 3 months to 8.96 at the end of 6 months of follow up (p=0.04). However other laboratory parameters like serum potassium, serum sodium, HCO3 and SPo4 were similar across all the follow up as compared to baseline values.

On comparing the liver function test parameters, it was found that we observed a significant change in all the liver function test parameters. Mean SGOT was significantly decreased from 33.92 at baseline to 21.71 at the end of 6 months (p=0.022). Similarly mean SGPT was also significantly decreased to 16.33 at the end of 6 months from 29.33 from baseline (p=0.009). Mean value of SAP was significantly decreased from 344.75 (baseline) to 305.17 (3 months) to 206.17 (at the end of 6 months (p<0.001).

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