

Adrenal Haemorrhages and Burns: An Autopsy Study

A.G. Vijay Kumar*, Kumar U.*, Shivaramu M.G.**

Abstract

Adrenal haemorrhage occurs secondary to both traumatic conditions and atraumatic conditions. Burns accounts for maximum number of cases of traumatic haemorrhages. The purpose of this study was to investigate the prevalence of adrenal haemorrhage in non-surviving patients with burns by evaluating the compiled autopsy study data. During the period between 1st July 2009 to 31st June 2011, totally 51 burns cases were autopsied, among them, adrenal haemorrhage was seen in 14 cases, of which 10 cases showed bilateral haemorrhages and 04 cases showed unilateral haemorrhages. Extensive, bilateral adrenal haemorrhages were more commonly seen in males. Acute adrenal insufficiency is an uncommon but devastating complication of severe burn injury. The diagnosis is rarely made ante mortem. The clinical importance of bilateral adrenal haemorrhage is that it may lead to acute adrenal insufficiency and possible death. Therefore, when a sudden deterioration in the patient with thermal injuries is encountered, adrenal insufficiency must be considered.

Key words: Burns; Adrenal hemorrhage; Septicemic shock.

Introduction

Adrenal haemorrhage occurs secondary to both traumatic conditions and atraumatic conditions. Burns accounts for maximum traumatic hemorrhages. Atraumatic causes of adrenal hemorrhage include Stress, Haemorrhagic diathesis, Neonatal stress, Underlying adrenal tumors and Idiopathic disease.[1]

Bilateral adrenal haemorrhages are a common condition that may lead to acute adrenal insufficiency and death. The clinical features of adrenal insufficiency are nonspecific and are easily confused with sepsis

or common postoperative complications leading to haemodynamic abnormalities and multiorgan involvement. The pathogenesis of adrenal haemorrhage in burn cases is typically multifactorial. Necrosis and haemorrhage may occur during burns as a result of ischemia or during adrenal stimulation from vascular engorgement and stasis.[2,3,4]

The diagnosis of adrenal insufficiency resulting from adrenal haemorrhage is often overlooked because of the nonspecific nature of the clinical presentation. Until recently, most diagnoses of adrenal haemorrhage were made at post-mortem examination. The reported prevalence of adrenal haemorrhage in general hospital autopsy studies is 0.14% to 1.8% although extensive bilateral adrenal hemorrhage may be present in 15% of individuals who die of burns.[5]

Aims & Objective

The purpose of this study was to investigate the prevalence of adrenal haemorrhage in non-surviving patients with burns by evaluating the compiled autopsy study data.

Authors affiliation: *Assistant Professor, **Professor and HOD, Department of Forensic Medicine & Toxicology, Adichunchanagiri Institute of Medical Sciences, Mandya, Karnataka State, India.

Reprints requests: Dr. A.G. Vijay Kumar, Assistant Professor, Department of Forensic Medicine & Toxicology, Adichunchanagiri Institute of Medical Sciences, Mandya, pin code-571448 Karnataka State, India.

E-mail: vijay.fmt@rediffmail.com

(Received on 27.12.2012, accepted on 22.05.2013)

Material and Methods

In this study, all the burn cases that were brought for post-mortem examination at mortuary of Adichunchanagiri Institute of Medical Sciences, Mandya District, Karnataka, India between 1st July 2009 to 31st June 2011 have been studied. The ethical clearance and permission from institutional ethics committee and review board has been obtained.

Results

During the period between 1st July 2009 to 31st June 2011, 51 burn cases were autopsied.

Table 1: In the present study, 35.3% of

Age group	Male	%	Female	%	Total	%
<10	00	00	00	00	00	00
11-20	04	18.2	00	00	04	7.8
21-30	07	31.8	11	37.9	18	35.3
31-40	05	22.7	09	31	14	27.5
41-50	03	13.6	06	20.7	09	17.6
>50	03	13.6	03	10.3	06	11.8
Total	22	100	29	100	51	100

Period of survival	No. of cases	%
Brought dead	00	00
<1 day	03	5.8
1-2 days	21	41.2
3-4 days	12	23.5
>5 days	15	29.4
Total	51	100

TBSA	No. of cases	%
<25%	07	13.7
26-50%	09	17.6
51-75%	15	29.4
76-100%	20	39.2
Total	51	100

Mode of death	No. of cases	%
Neurogenic shock	03	5.8
Septicaemic shock	21	41.2
Acute renal failure	12	23.5
Multi organ failure	15	29.4
Total	51	100

Total no. of burn cases	Adrenal hemorrhage seen	Unilateral Adrenal hemorrhage	Bilateral Adrenal hemorrhage
51 cases	14 cases (27.5%)	04 cases (28.6%)	10 cases (71.4%)

victims were between 21-30 years of age. Women were more involved than men with a ratio of 2.6: 1.

Table 2: Survival period of up to 2 days were seen in 41% of cases.

Table 3: Around 39% of victims sustained burns over 76-100% of their total surface area.

Table 4: The most common cause of death was septicemic shock (41.2%), followed by multiorgan failure (29.4%).

Table 5: Adrenal haemorrhage was seen in 14 cases, of which 10 cases showed bilateral haemorrhages and 4 cases showed unilateral haemorrhages. Extensive, bilateral adrenal haemorrhages were more commonly seen in males (male to female ratio of 2:1).

Discussion

Acute adrenal insufficiency is an uncommon but devastating complication of severe burn injury. The diagnosis is rarely made ante mortem.[6]

In a study done by Kallinen O and Koljonen V, maximum numbers of victims were males and all of them were beyond 30 years age group. Out of four victims, three members died due to multiple organ failure and survival period was more than seven days in most of the cases.[6]

According to Rao RH, most patients with nontraumatic, extensive, bilateral adrenal haemorrhage were aged 40-80 years at the time of the acute event. In contrast, patients with traumatic adrenal haemorrhage typically are in the second to third decade of life.[7]

Reiff *et al* found higher % TBSA and older age to be risk factors for acute adrenal insufficiency in severely burned patients by case-control study.[8]

According to a study done by Outi K and Virve K, bilateral adrenal haemorrhages were found in 3 cases and unilateral adrenal haemorrhage was seen in one case.[6]

According to a study done by Botteri A. and Orell SR. (1964), adrenal haemorrhages were observed in 19 cases and a minor bleeding in adrenal gland was found in 4 cases.[9]

A study done in University of Texas Southwestern Medical Center shows Acute, fatal, adrenal insufficiency in 3 patients among 807 critically ill patients with burns treated at their institution.[10]

A study done by Sammy AD, Robert BR, Richard JW, John AG Texas Tech University Health Sciences Center found adrenal hemorrhage in a 3 year old burns patient.[11]

In a study of 2000 consecutive general hospital autopsies, only 22 (1.1%) revealed bilateral AH[12]; however, as many as 15% of patients dying in shock have been demonstrated to have bilateral AH.[13]

Conclusion

Acute adrenal insufficiency may occur in association with extensive, bilateral adrenal haemorrhage, and it is uniformly fatal if unrecognized and untreated. Patients with adrenal haemorrhage may die because of underlying disease or diseases associated with adrenal haemorrhage, despite treatment with stress-dose glucocorticoids.

Overall, adrenal haemorrhage is associated with a 15% mortality rate, which varies according to the severity of the underlying illness predisposing to adrenal haemorrhage. Bilateral adrenal haemorrhage is rarely diagnosed clinically as its presentation is generally non-specific. The clinical importance of bilateral adrenal haemorrhage is that it may lead to acute adrenal insufficiency and possible death. Therefore, when a sudden deterioration in a patient with thermal injuries

is encountered, adrenal insufficiency must be considered.

Conflicting Interests

The authors declare that they have no conflicting interests. The authors have read and approved the final manuscript.

Consent

Written informed consent was obtained from the relatives of the deceased.

References

1. Akira K, Carl MS, Randy DE, Naoki T, Marilyn AR, Stanford MG, Elliot KF, and Reed D. Imaging of Nontraumatic Hemorrhage of the Adrenal Gland. *Radio Graphics* 1999; 19: 949-963.
2. Siu SC, Kitzman DW, Sheedy PF II, Northcutt RC. Adrenal insufficiency from bilateral adrenal haemorrhage. *Mayo Clin Proc.* 1990; 65: 664-670.
3. Jacobson SA, Blute RD Jr, Green DF, McPhedran P, Weiss RM, Lytton B. Acute adrenal insufficiency as a complication of urologic surgery. *J Urol.* 1986; 135: 337-340.
4. Miller EH, Woldenberg DH, Gitter RD, Zumoff B. Bilateral adrenal hemorrhage following surgery. *NY State J Med.* 1986; 86: 651-653.
5. Xarli VP, Steele AA, Davis PJ. Adrenal haemorrhage in the adult. *Medicine.* 1978; 57: 211-221.
6. Kallinen O and Koljonen V. Prevalence of adrenal hemorrhage in non-surviving patients with burns. *Burns.* 2011; 37: 1140 -1144.
7. Rao RH. Bilateral massive adrenal hemorrhage. *Med Clin North Am.* 1995; 79(1): 107-29.
8. Reiff DA, Harkins CL, McGwin Jr G, Cross JM, Rue 3rd LW. Risk factors associated with adrenal insufficiency in severely injured burn patients. *J Burn Care Res.* 2007; 28: 854-8.

9. Botteri A and Orell SR. Adrenal Hemorrhage and Necrosis in the Adult. *Acta Medica Scandinavica*. 175: 409-419.
10. Murphy JF, Purdue GF, Hunt JL. Acute adrenal insufficiency in the patient with burns. *Burn Care Rehabil*. 1993; 14: 155-7.
11. Sammy AD, Robert BR, Richard JW, John AG. Adrenal hemorrhage in a pediatric burn patient. *Burns*. 2001; 27(6): 658-661.
12. Xarli VP, Steele AA, Davis PJ, Buescher ES, Rios CN, Garcia- Bunuel R. Adrenal hemorrhage in the adult. *Medicine (Baltimore)*. 1978; 57: 211-21.
13. Vella A, Nippoldt TB, Morris 3rd JC. Adrenal hemorrhage: a 25-year experience at the Mayo Clinic. *Mayo Clin Proc*. 2001; 76: 161-8.

Indian Journal of Trauma and Emergency Pediatrics (Formerly Indian Journal of Emergency Pediatrics)

Handsome offer for Indian Journal of Emergency Pediatrics subscribers

Subscribe **Indian Journal of Trauma and Emergency Pediatrics (Formerly Indian Journal of Emergency Pediatrics)** and get any one book or both books absolutely free worth Rs.400/-.

Offer and Subscription detail

Individual Subscriber

One year: Rs.1000/- (select any one book to receive absolutely free)

Life membership (valid for 10 years): Rs.5000/- (get both books absolutely free)

Books free for Subscribers of **Indian Journal of Trauma and Emergency Pediatrics (Formerly Indian Journal of Emergency Pediatrics)**. Please select as per your interest. So, don't wait and order it now.

Please note the offer is valid till stock last.

CHILD INTELLIGENCE

By Dr. Rajesh Shukla

ISBN: 81-901846-1-X, Pb, vi+141 Pages

Rs.150/-, US\$50/-

Published by **World Information Syndicate**

PEDIATRICS COMPANION

By Dr. Rajesh Shukla

ISBN: 81-901846-0-1, Hb, VIII+392 Pages

Rs.250/-, US\$50

Published by **World Information Syndicate**

Order from

Red Flower Publication Pvt. Ltd.

48/41-42, DSIDC, Pocket-II, Mayur Vihar, Phase-I

Delhi - 110 091 (India)

Tel: 91-11-65270068, 22754205, Fax: 91-11-22754205

E-mail: redflowerpppl@gmail.com, redflowerpppl@vsnl.net

Website: www.rfpppl.com