Frequency and predictive factors of acute adrenal insufficiency following brain injury

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Endocrinology unit.Central Hospital of Army Algiers .Algeria. Critiacal care unit .Centarl hospital of army .Algiers .Algeria.Neurosurgery unit .Centarl hospital of Army .Algiers Algeria, . Critiacal care unit .Salim Zemirli Hospital. Algiers .Algeria *, Neurosurgery unit .Salim Zemirli Hospital .Algiers Algeria**

I-Background: Biological diagnosis of adrenal insufficiency (AI) is very difficult in the setting of critical illness like in traumatic brain injury (TBI), and the cut off defining AI need more precision.

II-The aim: is to assess the frequency and predictive factors of AI in a simple of 277 victims of moderate to severe BI in two neighbors' hospitals in the east of Algiers.

III-Method: Between November 2009 and December 2013, 277 patients victims of moderate to severe TBI aged from 18-65 years old were included .
During the acute post injury period (**0-7 days**):
-Measurement of serum cortisol in all patients at 8-9 pm.
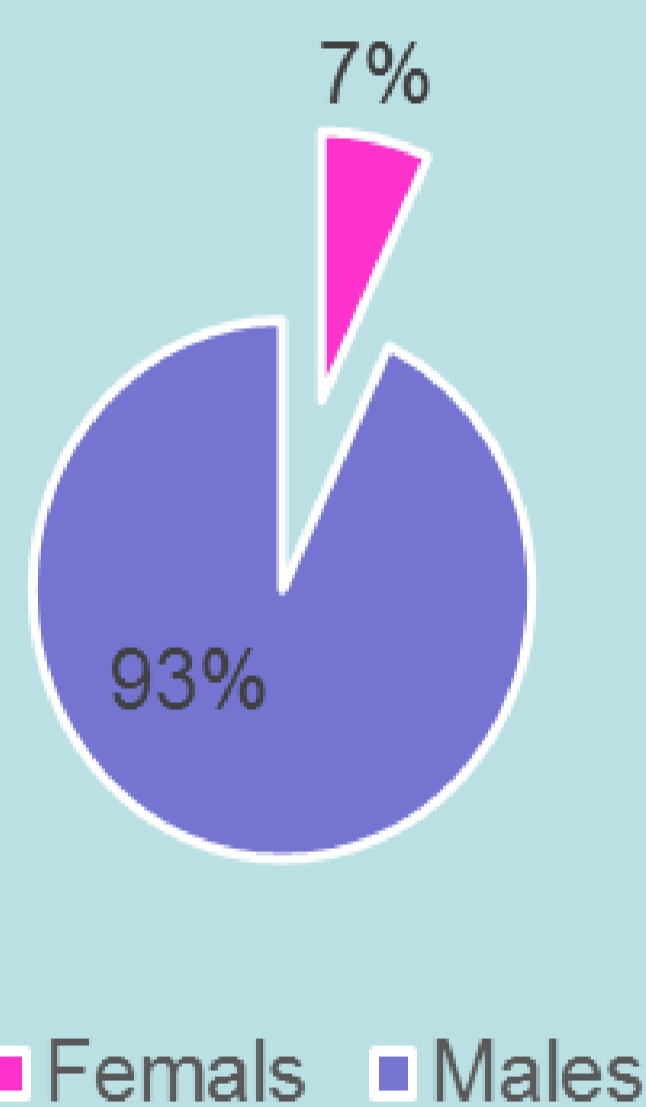-TBI subjects were defined as having AI using three cut offs:
   83 nmol/l :the value that indicate severe AI usually admitted by endocrinologists.
   276 nmol/l: the value indicating AI in critical illness according to the consensus statements from an international task force by the American college of critical care medicine
   414nmol/ l: the value admitted by Hannon and al which indicate AI in victims of TB
 Variables studied were : age, severity of BI, duration of intubation and coma, pupillary status ,presence of hypotension and anemia (Hb<9dg/ml). CT findings were classified according to Marshall Classification, the presence of skull base fracture was assessed. The presence of insipidus diabetes, the kind of medications for sedation in intubated patients .
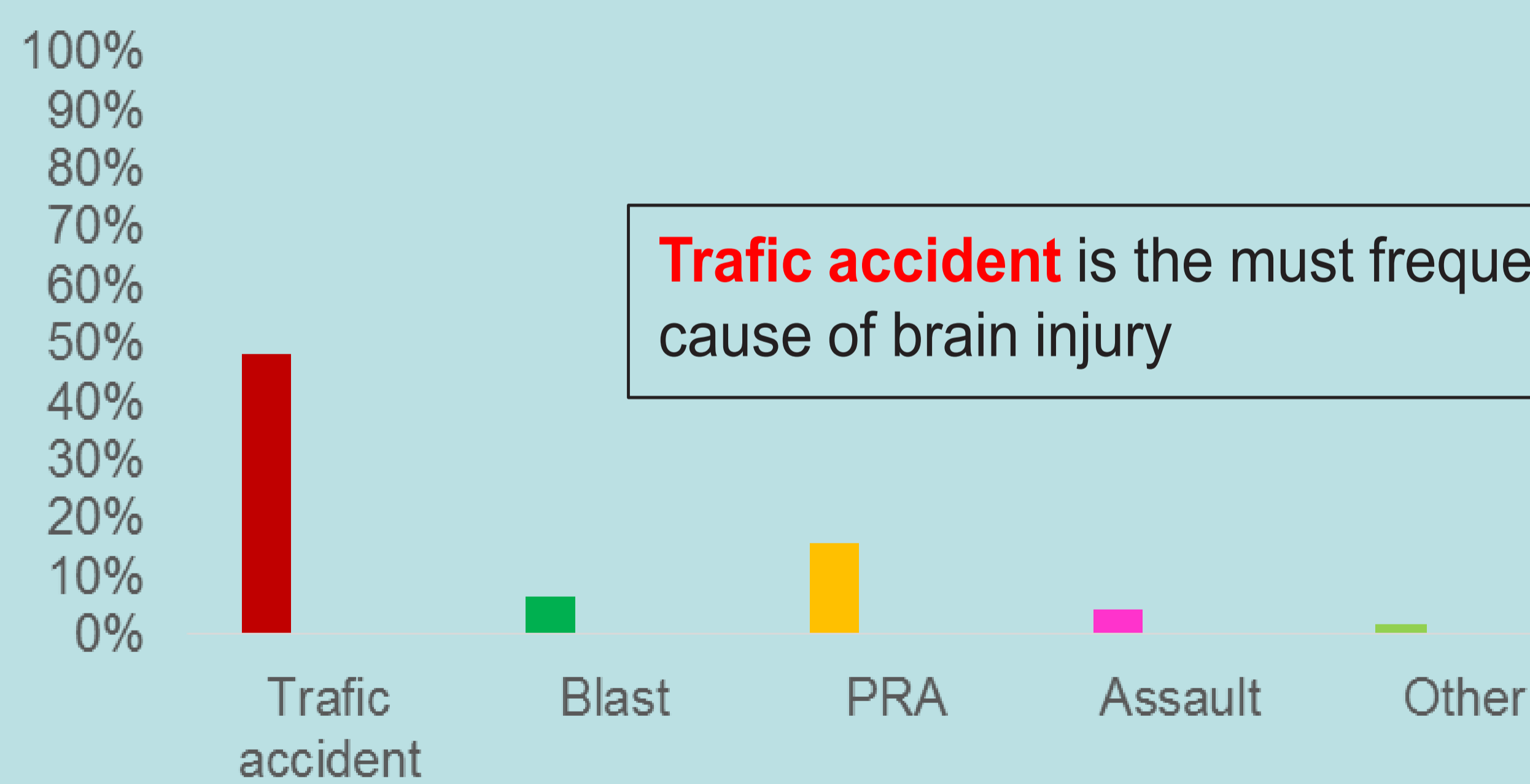
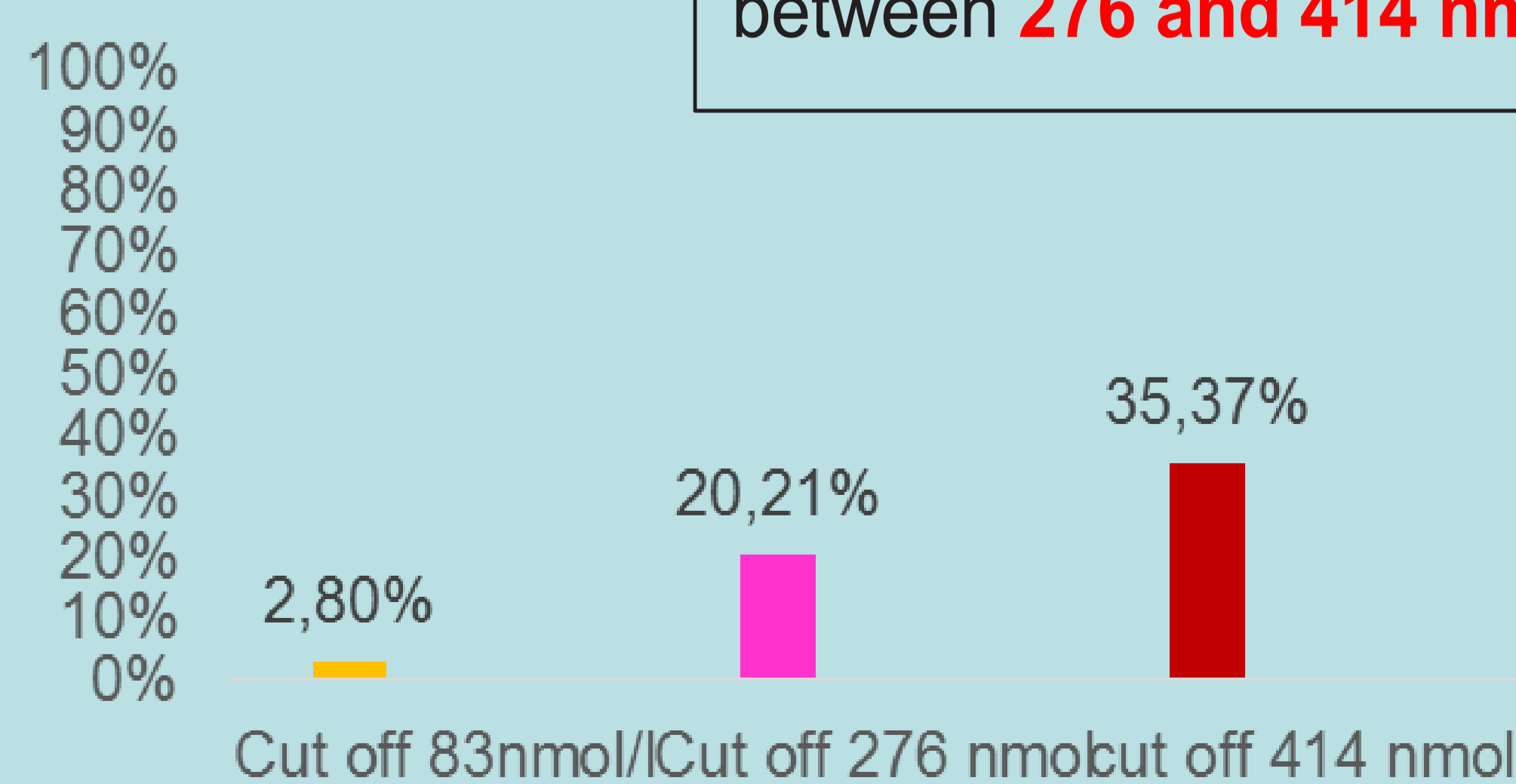## VI-Results:

7%
93%

Maedl age:31,85±11,08 years

Brain injury is frequent in young adult men

■ Femals ■ Males

Figure 1:Age and sex distribution

100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%

Trafic accident is the must frequent cause of brain injury

Trafic accident   Blast   PRA   Assault   Other

Figure 2:causes of brain injury

Severe adrnal defficency is not frequent
AI is relatively frequent for cut off of cortisol between **276 and 414 nmol/l**

100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%

2,80%   20,21%   35,37%

Cut off 83nmol/l Cut off 276 nmol Cut off 414 nmol

Figure 3:Frequency of acute AI

Predectif factors	For cortisol cut off of 83 nmol/l	For cortisol cut off of 276 nmol/l	For cortisol cut off of 414 nmol/l
Severity of brain injury TC(GCS)	No (p=0,12)	Non (p=0,73)	No (p=0,44)
Head imaging (TDM)	No (p=0,71)	Non (p=0,43)	No (p=0,56)
Anemia	No (p=0,89)	Non (p= 0,55)	No(p=0,22)
Systolic blood pression	No(p=0,34)	Non(p= 0,34)	No (p=0,34)
Diastolic blood pression	yes (p=0,012)	yes (p= 0,04)	No (p=0,42)
Pupillary status	No (p=0,72)	No (p= 0,15)	No (p=0,24)
Insipidus Diabetes	No (p=0,64)	No (p= 0,12)	Yes (p=0,04)
Skull base fracture	No (p=0,64)	Yes (p=0,032)	No (p=0,64)
Sedation	No (p=0,10)	No (p=0,10)	No (p=0,63)
Polytraumatism	No (p=0,63)	No (p=0,61)	No (p= 0,69)
Head surgery	No (p=0,4)	No (p=0,77)	No (p= 0,44)

Table 1:predictifve factors of acute AI (bivariate study)

83 nmol/l	Hypnovel		Fentanyl/sufentanyl		Propofol		Pentothal		Phenobarbital	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
AI+	2	6	4	4	2	6	4	4	0	8
AI-	152 114		158	108	152 114		21 245		7	259
p	0,19		0,85		0,07		0,00023		0,88	

Table 2:influense of drugs used for sedation on acute AI

Predictive factors of acute AI following BI in bivariate study are diastolique hypopression , Pentobarbithal prescription ,insipidus diabetes and skull base fracture for cortisol levels cut off of : 276 nmol/l, 83 nmol/l, 414 nmol/l and 276nmol/l respectively

Litterature reveiw of predictive factors of acute AI following BI :
Severity of injury (GCS): predective for Olivcrona,Agha ,Della Corte,Prasanna.
Not predictive for Cohan
Head radiological findings : are not predictive for Agha ,Olivcrona
Medications: The link betwen using Penthobarbithal ans acute AI has been prouved by Cohan
Ischemic factors (anemia,hypotension and ischemia) were predective on acutre AI for Chohan

V-Conclusion :In acute phase of brain injury, changes on cortisol metabolism may be transient and the frequency of severe AI is low (cortisol<83 nmol/l) .
 However this level is not appropriate to the critical illness status following BI and the cut off of 276 and 414 nmol/l seems to be more appropriate .
Following BI .In the case of hemodynamic instability ,the prescription of high doses of Propofol and Pentoparbithal ,the base skull fracture and insipidus diabetes ,cortisol must be dosed and treatment of AI for levels less than 200 nmol/l must be started.

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