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Original Research Article

To evaluate outcome in prevention of ACS in blunt trauma abdomen cases of management

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Abstract

Background & Methods: The aim of the study is to assess outcome in prevention of ACS in blunt trauma abdomen cases. The bladder is drained & then it is filled with 25 ml of normal saline. This saline in the bladder acts as a passive diaphragm for pressure transmission. The drainage tube is clamped beyond the aspiration port & a 16-gauge needle is inserted into the port.

Results: Marked improvement in the vitals & other parameters after conservative management is shown in the chart. Pulse was reduced by 41% Respiratory rate improved by 65%, & urine output was improved from 318.5 ml/12 hr. to 1103.4 ml/12 hr. 100% patients developed respiratory distress in the ACS group while 14.4% of patients developed respiratory distress in the non ACS affected group.

Conclusion: Reversal of all the adverse effects of raised IAP & ACS, were reflected in terms of improvement in vitals i.e. pulse rate, mean IAP, respiratory rate & urine output of surviving patients after non-operative management. There has been significant decrease in the raised intra-abdominal pressure after incorporation of non-operative measures.

Patient compliance has been better with the conservative approach. Thus it can be concluded that, Abdominal compartment syndrome is prevalent in blunt trauma abdomen patients, adding to the cause of increased mortality.

Keywords: nonoperative, management, reduction, prevention & ACS.

Study Design: Observational Study

1. Introduction

Intra-abdominal hypertension (IAH) & abdominal compartment syndrome (ACS) have been increasingly recognized in the critically ill as causes of significant morbidity & mortality[1]. The variety of previous definitions has led to confusion & difficulty in comparing one study to another. An international group of critical care specialists convened to standardize definitions for both IAH & ACS as well as establish standards for the measurement of intra-abdominal pressure (IAP) [2].

The primary pathophysiologic event leading to intra-abdominal hypertension & the abdominal compartment syndrome (IAH/ACS) is interstitial edema in the bowel & mesentery due to capillary endothelial damage. This capillary endothelial damage occurs due to ischemia from the original physiologic insult (sepsis, hemorrhage, etc) & due to secondary damage from the pro-inflammatory cytokines released in response to this insult[3]. Many litres of interstitial fluid can accumulate within the intra-abdominal compartment via this mechanism. As fluid accumulates the abdominal wall & fascia are slowly stretched until they

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becomes less compliant, causing the pressure within the abdominal cavity to rise. Elevation of IAP has serious impact on organ perfusion throughout the body.
An especially susceptible organ to tissue ischemia/reperfusion injury, capillary leak & edema is the bowel. Since the abdominal wall limits the total volume of intra-abdominal space, as bowel expands the pressure within the abdomen also increases[4]. This causes occlusion of capillary blood flow & ultimately ends in compromise of venous return & arterial flow. The resulting ischemia triggers a vicious cycle of further inflammation, capillary leak, bowel edema & increasing intra-abdominal pressure. Normal intra-abdominal pressure is 0-5 mm Hg. Physiologic compromise begins when the pressure rises above 8-10 mm Hg. Once the pressures increase beyond about 20 mm Hg irreversible tissue injury occurs, ultimately resulting in ACS & multiple organ failure[5-7]. Early recognition of rising abdominal pressure is critically important because it allows prompt intervention which will prevent ACS from developing, leading to a much better prognosis for the patient.

2. Material & Methods

Present study was conducted on 100 patients for 02 Years. IAP can be measured by direct or indirect methods. Though the direct methods are quite accurate over all ranges of IAP, it is impractical & not feasible for routine practice. Indirect pressure measurement is done through Inferior Vena cava, gastric, rectal & Urinary Bladder. However, the simplest & the method of choice is transurethral measurement of UBP using a Foley's catheter. The bladder is drained & then it is filled with 25 ml of normal saline. This saline in the bladder acts as a passive diaphragm for pressure transmission. The drainage tube is clamped beyond the aspiration port & a 16-gauge needle is inserted into the port. The tubing is then attached to water manometer or a pressure transducer, at the end of expiration in supine position, using the midaxillary line as the zero reference point.

Laboratory Investigation:
Hb.
Total Leucocyte Count.
Blood Urea.
Serum Creatinine

3. Result

Table 1: Age Distribution

Age in years	No. of cases	Percentage
20-30	12	12
30-40	48	48
40-50	33	33
50-60	06	06
>60	01	01

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Table 2: Showing Management Efficacy in ACS Diagnosed Patients (Mean Value)

Parameters	Before management	After management
Pulse (per min)	128.9	73.1
R. Rate (per min)	44.3	15.7
A. Girth (inch)	91.6	84.2
U. Output (ml)/12 hr	318.5	1103.4

Marked improvement in the vitals & other parameters after conservative management is shown in the chart. Pulse was reduced by 41% Respiratory rate improved by 65%, & urine output was improved from 318.5 ml/12 hr. to 1103.4 ml/12 hr.

Table 3: Showing Respiratory Distress in ACS

Resp. Distress	With ACS	Without ACS	Total
Present	03	14	17
Not present	00	83	83
TOTAL	03	97	100

In the present study, 100% patients developed respiratory distress in the ACS group while 14.4% of patients developed respiratory distress in the non ACS affected group.

Table 4: Showing IAP & MAP in ACS Affected Cases

	Before Intervention	After Intervention (24 hrs)
IAP(mean)	25.4	12.8
MAP(mmHg)	28.3	83.4

In the present study, IAP is reduced by 50.3%, & MAP is increases in %

4. Discussion

Sufficient evidence now supports the concept that elevated intra-abdominal pressure impaires physiology & organ function by producing abdominal compartment syndrome (ACS). Prolonged unrelieved increased IAP at greater than 20 mm of Hg can produce compromised pulmonary function, renal impairment, cardiac failure, shock & death. Both IAH & ACS are etiologically related to increased morbidity & mortality of critically ill patients[8]. High IAP & ACS occur frequently in patients with blunt trauma, acute abdominal syndrome such as ileus, intestinal perforations, & acute pancreatitis. In developed countries, trauma & acute pancreatitis remains the common cause of abdominal compartment syndrome.

We measured the IVP twice daily using CVP manometer which was connected to the Foley's catheter. 25 ml of NS was instilled through Foley catheter & it was connected to the CVP manometer. Rise in CVP pressure determines the increase in intra-abdominal pressure in terms of cm of NS. This value was converted into mm of Hg (1 mmHg=1.36 cm of water). IAP more than 20 mm of Hg was diagnosed as a case of ACS. Those with intra-abdominal hypertension (IAH), were managed conservatively (non-operative management) in terms of fluid restriction, sedation, bowel evacuation etc[9-11]. Those who developed frank ACS underwent intervention either in the form of laparotomy or drain placement. I measured the outcome in terms of improvement in vitals i.e. pulse rate, respiratory rate, abdominal girth, intra-abdominal pressure, & urine output. The patients were also assessed in terms of morbidity (total hospital stay), mortality (deaths) & survival[12-13]. This is the first study of its type analyzing the incidence of ACS in blunt trauma abdomen patients & their

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management & prevention by non-operative methods. Reed, S.F., et al., were able to reduce IAP by 6 mm of Hg within 30 min of catheter placement in patients whose IAP crossed the 20 mm of Hg.

5. Conclusion

Reversal of all the adverse effects of raised IAP & ACS, were reflected in terms of improvement in vitals i.e. pulse rate, mean IAP, respiratory rate & urine output of surviving patients after non-operative management. There has been significant decrease in the raised intra-abdominal pressure after incorporation of non-operative measures.
Patient compliance has been better with the conservative approach. Thus it can be concluded that, Abdominal compartment syndrome is prevalent in blunt trauma abdomen patients, adding to the cause of increased mortality.

6. References

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