Original Research Paper

Surgery

THE BURDEN, PROFILE AND RISK FACTORS IN SEVERE COMMUNITY ACQUIRED INTRA-ABDOMINAL INFECTIONS ADMITTED TO INTENSIVE CARE IN A TERTIARY CENTRE IN SOUTH INDIA

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ABSTRACT **Background:** Community Acquired Intra-Abdominal Infections are common admissions in Intensive Care Units. Better management of these cases and better survival rates can be achieved only if there is a better understanding of patient profiles and risk factors associated with mortality. We aim to highlight the disease burden , profile and risk factors for increased increased adverse outcome of severe community acquired intraabdominal infections admitted to an intensive care unit in a tertiary care centre in south India.

Methods: We conducted a retrospective study of patients admitted to the Surgical ICU and Surgical HDU during a two year period (Jan 2014 to Dec 2015) with community acquired Intra-abdominal Infections. Primary outcomes were risk factors associated with increased adverse events(a composite of death and terminal discharge) and secondary outcomes were risk factors associated with increased ICU stay and ICU free stay.

Results: Patients presenting to our centre with intra-abdominal infections were overwhelmingly younger males. APACHE scores of 25-29 were found to be significantly associated with adverse outcomes.

Conclusion: Despite advances in diagnosis, surgery and antimicrobial therapy, mortality associated with intra-abdominal infections remains still unacceptably high. More studies are needed to better understand this disease process and improve its management.

KEYWORDS : Intra-abdominal infections, adverse outcomes, risk factors, profile

Introduction

Community acquired Intra-abdominal infections are a common cause for admission in the ICUs in India. Achieving positive outcomes in these patients can be complicated and needs timely surgical intervention and intensive care support services [1]. The clinical profile of such patients is different from that seen in western countries[2] and more data from India regarding the etiology, prognostic indicators, morbidity and mortality patterns and clinical practices are needed to better understand the disease in the Indian subcontinent. Such data is scarce in India.[3] We aim to highlight the disease burden , profile and risk factors of severe community acquired intraabdominal infections admitted to an intensive care unit in a tertiary care centre in south India.

Methods

Setting: A 13 bedded Surgical Intensive Care Unit (SICU) and a 9 bedded Surgical High Dependancy Unit (SHDU) in a tertiary hospital in South India.

Design: Retrospective cohort study of patients admitted to the SICU and SHDU with community acquired Intra-abdominal infections. The Institutional Review Board and Ethics committee of the institution approved the study proposal.

Data collection: 2 study investigators independently reviewed the records of admissions to the SICU during the study period, through the hospital electronic record system, ICU data base and by going through discharge summaries. Data was collected and transcribed onto an excel sheet for the analysis.

The data was analysed using IBM Statistics SPSS 21 package. The descriptive statistics, frequencies and percentages were done. The outcome variables(hospital outcome, ICU stay and ICU free stay) were compared among various factors such as age, sex, APACHE score, duration of symptoms and the day of surgery, using univariate logistic regression analysis and the Odds ratio and its 95% Confidence Interval is also presented.

Definitions:

Community acquired peritonitis: Defined as a condition in which a patient presents with clinical features of peritonitis from the community without any prior healthcare exposure with intraoperative confirmation of a perforated viscus.

ICU Free stay: Twenty-eight minus duration of ICU stay. ICU free stay equals zero if patient dies or is terminally discharged [4].

Inclusion criteria:

All adults (> 15 years of age) admitted to the ICU between January 2014 and December 2015 with peritonitis that was subsequently confirmed at surgery to be a perforation of any part of the gastrointestinal tract .
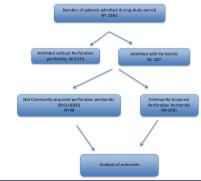
Exclusion Criteria:

(a) Adults with Hospital acquired peritonitis (i.e., any peritonitis that was deemed to be hospital acquired or had been pre-treated elsewhere for peritonitis for more than 48 hours). The time of separation between community acquired and hospital-acquired peritonitis was after admission to the hospital or when acquisition of the peritonitis was when patients were in the premises of the hospital.

(b) Patients transferred or referred from other Hospitals were also excluded

(c) Intra-abdominal infections other than hollow viscous perforations were also excluded.

Primary Outcome: Risk factors associated with adverse outcomes, which was defined as a composite of death or terminal discharge.

Secondary outcome: Risk factors associated with longer ICU stay and ICU free stay.

Consort diagram:

Results:

Among 2,581 patients admitted to the ICU over the study period (January 2014 to December 2015), 207 patients were admitted with acute peritonitis; of which 109 patients were admitted with community acquired hollow viscous perforation peritonitis.

Table 1: Baseline Characteristics

Criteria	No. of patients(%) n=109
Age	
<50	65(59.6)
>50	44(40.4)
Sex	
Male	84(77.1)
Female	25(22.9)
Comorbidities	
Diabetes Mellitus	12(11%)
Hypertension	9(8.3%)
Chronic renal failure	1(0.9%)
Ischaemic heart disease	3(2.8%)
BMI	
<18.5	12(11%)
18.5-24.9	66(60.6%)
25-29.9	26(23.9%)
>30	5(4.6%)
APACHE score	
0-5	21(19.3%)
4-9	26(23.9%)
10-14	20(18.3%)
15-19	19(17.4%)
20-24	14(12.8%)
25-29	6(5.5%)
30-34	2(1.8%)
>35	1(0.9%)
Days of symptoms	
1 day	49(45%)
2-4 days	39(35.8%)
>4 days	21(19.3%)
Day of surgery(from presentation)	
First day	74(67.9%)
Second day	32(29.4%)
Third day	3(2.8%)

Table 1 shows the baseline characteristics of patients who had intra-abdominal infections during the study period. The majority of the patients who made up the cohort were under the age of 50 years ie they made up 59.6% of the cohort. Males far outnumbered women at 77.1% vs 22.9%. 60.6% of subjects had normal BMIs. 22.9% of patients had co-morbidities, of which Diabetes mellitus was the most common. The presenting APACHE score in the icu varied, but 78.9% of subjects presented with APACHE scores between 0-19. Only 3 patients had an APACHE score more than 30 . 45% of patients presented after just 1 day of abdominal symptoms, while 35.8% of patients presented after 2-4 days of symptoms. Surprisingly, only 67.9% of patients were operated on the first day of presentation, while the rest were operated on the second or third day.

Table 2: primary Outcome- Risk factors for death or terminal discharge in those with intra-abdominal infections.

Risk factors		Hospital outcome				Risk estimate		p value
		death/terminal discharge		Survivors at day 30				
		n	%	n	%	OR	95% CI	
Age	<50	10	15.4	55	84.6			
	>=50	10	22.7	34	77.3	1.62	.61, 4.29	.331
Sex	Female	6	24.0	19	76.0	1.58	.54,4.66	.408
	Male	14	16.7	70	83.3			
BMI	<18.5	2	16.7	10	83.3	1.12	.21, 5.89	.894
	18.5 -24.9	10	15.2	56	84.8			
	25-29.9	8	30.8	18	69.2	2.49	.85,7.26	.095
	>=30	0	.0	5	100.0	-	-	.999
Duration of Symptoms	1 day	8	16.3	41	83.7			
	2-4 days	7	17.9	32	82.1	1.12	.37,3.42	.841
	>4days	5	23.8	16	76.2	1.60	.46,5.63	.463

Day of surgery From Presentation	First day	15	20.3	59	79.7			
	2nd or 3rd day	5	14.3	30	85.7	.66	.22,1.98	.453
APACHE SCORE	0-4	2	9.5	19	90.5			
	5-9	3	11.5	23	88.5	1.24	.19, 8.20	.824
	10-14	2	10.0	18	90.0	1.06	.13, 8.31	.959
	15-19	3	15.8	16	84.2	1.78	.26, 12.01	.553
	20-24	4	28.6	10	71.4	3.80	.59, 24.46	.160
	25-29	3	50.0	3	50.0	9.50	1.09, 82.73	.041
	30-34	2	100.0	0	.0	-	-	.999
	>=35	1	100.0	0	.0	-	-	>.999

Table 2 shows the primary outcome of the study. 84.6% of patients less than 50 years of age survived as compared to 77.3% among patients above the age of 50. However, this difference did not reach significance. 76% of women survived, while the percentage of survival was 83.3% for men. It was found that 15.2% of patients with a normal BMI had adverse outcomes, whereas 30.8% of patients had adverse outcomes in the BMI 25-29.9 group. The p-value was 0.095, showing a trend towards significance. Among those who presented on day 1 of symptoms, 83.7% of them survived, whereas only 76.2% of patients presenting after day 4 survived. An APACHE score between 25-29 was significantly associated with adverse outcomes. It was surprising to note that APACHE scores above 30 were not significantly associated with adverse outcomes, but it was limited by a low number of patients in these categories.

Table 3:Risk factors for ICU stay in patients with intra-abdominal infection

Risk factor		P value	95% C.I
Age	Less than 50		
	More than 50	0.225	0.187, 1.484
Sex	Male		
	Female	0.496	0.496, 4.253
BMI	<18.5	0.318	0.040, 2.843
	18.5-24.9		
	25.9-29.9	0.528	0.200, 2.283
	>or= 30	0.346	0.376, 16.293
Days of symptoms	1 day		
	2-4 days	0.561	0.495, 3.654
	More than 4 days	0.132	0.023, 1.633
Day of surgery	First day		
	Second or third day	0.095	.865, 6.065
APACHE score	0-4		
	5-9	.998	
	10-14	.998	
	15-19	.998	
	20-24	.998	
	25-29	.998	
	30-34	1	
	>=35	1	

Table 3 shows the risk factors for duration of ICU stay. It was found that patients who underwent surgery on the second or third day after presentation, spent more time in the ICU, but the difference was not significant. None of the other categories compared showed significant association with longer ICU stays. The mean number of days spent in the ICU by survivors was 2.88, as compared to 5.15 days among non-survivors.

Risk factor		P value	95% C.I
Age	Less than 50		
	More than 50	0.070	0.181, 1.069
Sex	Male		
	Female	0.831	0.425, 2.906
BMI	<18.5	0.571	0.164, 2.712
	18.5-24.9		
	25.9-29.9	0.339	0.211, 1.708
	>or =30	0.762	0.207, 8.573
Days of symptoms	1 day		
	2-4 days	0.987	0.405, 2.507
	More than 4 days	0.864	0.294, 2.792
Day of surgery	First day		
	Second or third day	0.857	0.454, 2.587

APACHE score	0-4		
	5-9	0.851	0.259, 3.046
	10-14	0.181	0.077, 1.624
	15-19	0.906	0.245, 3.477
	20-24	0.327	0.500, 7.997
	25-29	0.441	0.039, 4.115
	30-34	0.641	0.108, 36.954
	>=35	0.000	

Table 4 shows the risk factors studied for number of ICU free days. Patients in the age group more than 50 were found to have longer number of ICU free days.

Table 5: Site of perforation

Site of pathology	Number(%)
Appendicular	18(16.51%)
Caecal	1(0.92%)
Colonic	6(5.50%)
Gastroduodenal	50(45.87%)
Jejunal	11(10.09%)
Ileal	19(17.43%)
Jejunal and ileal	2(1.83%)
Duodenal and jejunal	1(0.92%)
Rectal	1(0.92%)

Table 5,gives a breakdown of the anatomical distributions of pathologies encountered in patients who presented with intraabdominal infections.

Discussion

Community acquired intra-abdominal infections are an important cause of morbidity and are frequently associated with a poor prognosis [5]. It has been found however, that early detection, followed by prompt surgery and initiation of appropriate antibiotics can limit the associated mortality [6].

Majority of patients who were admitted to our hospital with community acquired intra-abdominal infections, were below the age of 50 (59.6% of subjects) and the overwhelming majority were men (77.1%). Studies done in India [7] have shown similar results whereas studies conducted in the western hemisphere show that the mean age of presentation is between 45-60 years [8]. Most patients present to the hospital later than desirable with only 45% of patients coming to the hospital on the first day of their symptoms. As a result, by the time the patients present to the hospital, they have well established peritonitis and sepsis, which was borne out by the fact that 56.8% of patients had an APACHE score more than 10 which can equate to mortality rates of 10% [9].

The perforations of proximal gastrointestinal tract were less common as compared to perforations of distal gastrointestinal tract as has been noted in earlier studies from the west [10], and other studies conducted in Asia [11].

The incidence of adverse outcomes in our study, which was a composite of death and terminal discharge was 18.34%. This was found to be lesser than in studies done in the west on the same cohort of patients [12].

An APACHE score of 25-29 was found to be significantly associated with adverse outcomes as defined by our study. Other studies have shown that APACHE scores more than 15 are significantly associated with mortality. In our study, probably due to lack of adequate numbers of patients in other APACHE score categories , other APACHE score categories did not appear to be significantly associated with increased mortality. None of the other variables studied were found to be significant predictors of adverse outcomes.

Age, sex, BMI, APACHE scores, number of days of symptoms, and day of surgery were not found to significantly impact on length of ICU stay or number of days spent in the hospital.

The median number of days spent in the ICU by survivors was 2, as compared to 4.50 days among non-survivors. Data from other studies showed that median ICU stay for survivors was 10 days and 15 days for non survivors [12].
The differences in mortality and length of ICU stay between patients in our centre and others could be explained by the fact that our patients were not as sick as patients in other studies. The median APACHE score in our study among survivors was 11 , while it was 19 among non survivors. In other studies , the median APACHE score among survivors and non-survivors was 19 and 26 respectively . Other explanations could include short duration of illness (a median time of presentation of about 2 days) and good microbiological services [15].

Limitations of our study would be that it was a retrospective study and it was conducted in a single centre.

Conclusion
Despite advances in diagnosis, surgery and antimicrobial therapy, mortality associated with intraabdominal infections remains still unacceptably high. More studies are needed to better understand this disease process and improve its management.

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