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Factors affecting treatment outcome in patients with Acute Mesenteric Ischemia

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ABSTRACT

Background: Acute mesenteric ischemia (AMI) is a syndrome caused by inadequate blood flow through the mesenteric vessels, resulting in ischemia and eventual gangrene of the bowel wall. It may be classified as either arterial or venous. The purpose was to investigate the factors affecting the treatment outcome of the patients presenting with acute mesenteric ischemia.
Methods: This study included 50 adult patients admitted with AMI at the Alexandria Main University Hospital from January 2014 to January 2015. Analysis of the factors, Age, Gender, Drug history, Cardiovascular and Renal disease, Vital signs (blood pressure, pulse, temperature, and respiratory rate), laboratory investigations and line of treatment in relation to the outcome.
Results: In this study, 50 patients were enrolled, 40 female patients and 10 were males. The mortality rate was noticed more in the age above 50 years with history of cardiovascular disease or renal disease and systolic blood pressure less than 90 mmHg on admission.
Conclusion: The incidence of AMI is more common above age of 50 years. Abdominal tenderness is the most common findings in patients presented with AMI.

Key words – ischemia, vascular occlusion.

INTRODUCTION

Mesenteric ischemia is a medical condition in which inflammation and injury of the small intestine occurs due to inadequate blood supply (1,2). Causes of the reduced blood flow can include changes in the systemic circulation (e.g. low blood pressure) or local factors such as constriction of blood vessels or a blood clot. It is more common in the elderly (3,4). Acute mesenteric ischemia refers to the sudden onset of intestinal hypoperfusion, which can be due to occlusive or non- occlusive obstruction of arterial or venous blood flow. Occlusive arterial obstruction is most commonly due to acute embolic or thrombotic occlusion of the superior mesenteric artery (SMA), thrombosis (MVT). for practical purposes, AMI comprises 4 different primary clinical entities, as follows: NOMI, AMAE, AMAT, and MVT (5). The aim of this work was to investigate the factors affecting the treatment outcome of the patients presenting with acute mesenteric ischemia

MATERIALS AND METHODS

The registry for patients presented to the Alexandria Main University hospital, Egypt with mesenteric vascular occlusion in a period of one year (2014 to 2015) was retrospectively reviewed (1,2). Patients presenting with chronic mesenteric ischemia were excluded from the study. Analysis of the factors, Age, Gender, Drug history, Cardiovascular and Renal disease, Vital signs (blood pressure, pulse, temperature, and respiratory rate), laboratory investigations and line of treatment in relation to the outcome.

RESULTS

Forty patients were female and ten were male. Mortality was more in males (70%, 7/10) than females (42.5%, 17/40), which was not significant (p= 0.164).

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Table-1. Relation between outcome and demographic data

Demographic Data	Outcome				Test of significance	p
	Survival (n = 26)		Mortality (n = 24)			
	N	%	N	%		
Gender						
• Male (n=10)	3	30.0	7	70.0	χ^2=2.424	^{FE}p=0.164
• Female (n=40)	23	57.5	17	42.5		
Age (years)						
• < 30 (n=3)	3	100.0	0	0.0		
• 30 < 40 (n=7)	7	100.0	0	0.0	χ^2=11.494*	^{MC}p=0.004*
• 40 < 50 (n=7)	3	42.9	4	57.1		
• ≥ 50 (n=33)	13	39.4	20	60.6		
Range	25.0 – 77.0		47.0 – 77.0		t=2.314*	0.026*
Mean ± SD.	52.04 ± 19.36		61.96 ± 9.73			
Median	53.50		65.0			

χ^2: Chi square test
FE: Fisher Exact test
t: Student t-test
*: Statistically significant at p ≤ 0.05

Table-2: Relation between outcome and co-morbidities

Patient history	Outcome				χ^2	p
	Survival (n = 26)		Mortality (n = 24)			
	N	%	N	%		
• **Drug history**						
No drug history (n=27)	18	66.7	9	33.3	5.059*	0.025*
With drug history (n=23) (Cordarone, Marivan, Anti-hypertenive)	8	34.8	15	65.2		
• **Cardiovascular disease**						
Free (n=18)	14	77.8	4	22.2		
HTN (n=21)	8	38.1	13	61.9	7.775*	^{MC}p= 0.046*
AF (n=4)	1	25.0	3	75.0		
HTN, AF (n=7)	3	42.9	4	57.1		
• **Renal disease history**						
No history of renal disease (n=36)	25	69.4	11	30.6	15.675*	<0.001*
History of renal disease (n=14)	1	7.1	13	92.9		

χ^2: Chi square test
MC: Monte Carlo test
FE: Fisher Exact test
HTN: Hypertension
AF: Atrial Fibrillation
*: Statistically significant at p ≤ 0.05

Survival was more in patients less than 50 years old, (76%, 13/17). Mortality was more in patients above 50 years old, (60%, 20/33), which was significant, (p=0.004) (Table-1).

Approximately two third of survived patients (69%, 18/26) were drug history free, and 15 of deceased patients, (62%, 15/24) had positive drug history, which was significant, (p=0.025). Half of survived patients (53%, 14/26) were free from cardiovascular disease, and (54%, 13/24), of deceased patients were hypertensive, which was significant, (p=0.046). Most of survived patients were free from renal disease and half of the deceased patients had renal disease, which was significant, (p=0.001) (Table-2).

As shown in Table-3, most of dead patients were shocked with systolic blood pressure less than 90 mmHg, which was significant (p<0.001), the pulse rate was more than 100 (beat/min) in 75% of dead patients (18/24), which was significant (p<0.001).

Serum creatinine and blood urea were significantly higher in deceased patients, (Table-4). Fluid collection was the most common finding by abdominal US in

Table-3. Relation between outcome and vital signs

Vital signs	Outcome					Test of significance	p
	Survival (n = 26)		Mortality (n = 24)		Total (n = 50)		
	N	%	N	%	N		
• **Systolic blood pressure (mmHg)**							
≥90 (n=31)	23	74.2	8	25.8	31		
<90 (n=19)	3	15.8	16	84.2	19		
							<0.001*
Range	70.0 – 170.0		50.0 – 100.0		50 – 170		
Mean ± SD	118.8 ± 28.4		78.54 ± 13.3		99.5 ± 30.2	t=6.491	<0.001*
Median	110.0		80.0		90.0		
• **Respiratory rate (breath/min)**							
14 – 20 (n=16)	14	87.5	2	12.5	16		
>20 (n=34)	12	35.3	22	64.7	34		0.001*
Range	14.0 – 38.0		17.0 – 41.0		14.0 – 41.0		
Mean ± SD	22.35 ± 7.52		30.17 ± 6.94		26.1 ± 8.2	t=3.812	<0.001*
Median	18.0		30.0		25.50		
• **Pulse (beat/min)**							
>100 (n=24)	6	25.0	18	75.0	24		
≤100 (n=26)	20	76.9	6	23.1	26		<0.001*
Range	74.0 – 110.0		95.0 – 140.0		74.0 – 140		
Mean ± SD	92.85 ± 11.9		115.46 ± 15.3		103.7±17.7	t=5.826	<0.001*
Median	91.0		110.0		100.0		
• **Temperature (°C)**							
36.5 – 37.5 (n=21)	16	76.2	5	23.8	21		
>37.5 (n=29)	10	34.5	19	65.5	29		<0.001*
Range	36.7 – 38.0		37.30 – 38.0		36.7 – 38		
Mean ± SD	37.47 ± 0.47		37.8 ± 0.28		37.6± 0.42	t=3.023	0.004*
Median	37.40		38.0		37.70		

t: Student t-test
χ^2, p: χ^2 and p values for Chi square test
*: Statistically significant at p ≤ 0.05

survived patients, and was not significant (p= 0.174), while distal obstruction and bowel loop distention were common CT scan findings in survived patient and were not significant (p= 0.456), (p= 0.333). But the relation between outcome and mesenteric vessels embolus or thrombus was significant (p= 0.049), (Table-5).

As shown in Table-6, 24 patients (48%), were managed conservatively, and 26 patients (52%) were surgically managed, which was significant (p= 0.049).

DISCUSSION

Mesenteric ischemia is a medical condition in which inflammation and injury of the small intestine occurs due to inadequate blood supply (1,2). Causes of reduced blood flow includes changes in systemic circulation (e.g. low blood pressure), or local factors such as constriction of blood vessels and blood clot (3,4). This prospective study was conducted to assess factors affecting the outcome of patients with acute mesenteric ischemia.

Table 4: Relation between outcome and renal function

Renal function	Outcome		Test of Significance	P
	Survival (n = 26)	Mortality (n = 24)		
• **Blood Urea mg/dl**				
Range	21.0 – 69.0	50.0 – 98.0		
Mean ± SD	38.65 ± 14.84	68.04 ± 12.89	t= 7.490*	<0.001*
Median	38.0	70.0		
• **Serum Creatinine mg/dl**				
Range	1.0 – 1.60	1.10 – 5.0		
Mean ± SD	1.23 ± 0.21	2.60 ± 1.03	Z=5.567*	<0.001*
Median	1.20	2.10		

t: Student t-test
Z: Z for Mann Whitney test
*: Statistically significant at p ≤ 0.05

Table-5: Relation between outcome and imaging (n=50)

Imaging	Outcome				χ^2	p
	Survival (n = 26)		Mortality (n = 24)			
	N	%	N	%		
Ultrasound findings						
• Fluid collection	16	61.5	19	79.1	1.847	0.174
• Distended bowel loops	15	57	17	70	0.935	0.333
• Bowel loop edema	6	23	7	29	0.241	0.624
CT findings						
• Distal obstruction	26	100	24	100	-	-
• Bowel loops distended	23	88.4	19	79	0.802	^{FE}p=0.456
• Fluid collection	20	76.9	19	79	0.037	0.848
• Mesenteric vessels embolus or thrombus	19	73	11	45.8	3.860*	0.049*

χ^2: Chi square test
FE: Fisher Exact for Chi square test

Table-6: Relation between outcome and line of treatment

Line of treatment	Outcome				χ^2	P
	Survival (n = 26)		Mortality (n = 24)			
	N	%	N	%		
• Conservative treatment (n=24)	9	37.5	15	62.5	3.888	0.049*
• Surgical intervention (n=26)	17	65.3	9	34.6		
Total	26	100.0	24	100.0		

χ^2: Chi square test

In the present study, the relation between outcome and demographic data showed that the incidence of AMI was more in patients more than 50 years. Mortality was more in this age than youngers. This was consistent with the reports of Kougias et al (6), and Park et al (7), in which, the mean age was ranged from 50 to 67 years old, and mortality was more common above the age of 50 years. In this series, the relation between outcome

and co-morbidities was as follows 65% of survived patients were drug history free and 66% of the died patients had positive drug history. This is not consistent with the results of the study done by Kougias et al (6), in which cardiovascular diseases was present only in 21% of all patients. In this series, the relation between outcome and vital signs showed that 90% of survived patients had systolic blood pressure more than 100 mmHg, while 70% of dead patients had systolic blood pressure less than 90 mmHg. The results of the present study is corresponding with the results of Alhan et al (8), who reported that the systolic blood pressure in survived patients was 120mmHg, while in dead patients it was 90 mmHg. In the present study, the relationship between outcome and renal functions showed that serum creatinine and blood urea were significantly higher in dead patients than survived. This was not consistent with the results of Aliosmanoglu et al (9), and Kougias et al (2007) (44), they reported that the level of serum urea has no significant effect on mortality ($P > 0.05$).

In this series the relation between outcome and imaging showed that by abdominal US, fluid collection and bowel loops distention were noticed in more than half of survived patients. However, CT scan showed that distal obstruction and bowel wall thickening was noticed in about 80% of survived patients. This was compatible with the reports of Park and colleagues, and the reports of other studies (7,10,11,12). In this study, the relation between outcome and line of treatment showed that surgical intervention was the most common line of treatment in survived patients. This was not consistent with the results of Brunaud et al (10), who reported that, mortality rate and survival rate were similar in surgical and conservative management. In a study done by Klar et al (13), they found that the mortality rate of mesenteric arterial ischemia was very common, which was not consistent with the present study. This results was corresponding with the reports of Stamatakos et al, and the reports of other studies, they reported that surgical intervention have accounted for better outcome (6,14,15).

CONCLUSION

The incidence of AMI is more common above age of 50 years. Abdominal tenderness is the most common findings in patients CT scan is considered the gold standard in the diagnosis of AMI. Occlusive mesenteric arterial ischemia is the most common type of AMI. Mortality rate of AMI approaches to 50% of patients with AMI. The independent significant factors affecting mortality (poor outcome) are, age above 50 years, drug history, hemodynamic instability, and high serum creatinine level (renal function).

Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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