ACUTE APPENDICITIS: GAINING TIME IN MASS CASUALTY SCENARIO

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ABSTRACT

Objective: To find out group of drugs best to gain time before appendicectomy in patients of acute appendicitis in mass causalities scenario.

Study Design: Quasi-Experimental.

Place and Duration of study: A post earthquake, resource constrained hospital taking care of dependant population of three districts at CMH RawlaKot from 15 Jan 2007 to 15 Jan 2008.

Patients and Methods: Ten patients were selected in each group by convenience sampling. Patients were divided into five groups Group I No Antibiotics, Group II Ampicillin / Gentamicin / Metronidazole, Group III Ceftriaxone / Metronidazole, Group IV Ampicillin / Sulbactum, Group V Cefoperazone / Sulbactum. Group I was taken as control where the appendectomy delay was according to the natural history of the disease. Group II, III, IV & V who had to be triaged and placed on antibiotics regimen before operation. Extreme care was taken so that this approach was only adopted in patients where the delay in appendectomy was inevitable. All patients were operated 24 to 72 hours after onset of symptoms. The grade of operative difficulty was assessed objectively and average difficulty scores were compared between the groups

Results: In the one year period 431 appendectomies were performed out of which 50 patients were included in the study. These 50 comprised of 10 patients in each group. Overall male to female ratio was 27:23. Overall average age was 25.14 + 7.54. In Group I an average delay before presentation 57.6 + 12.39 hrs. In Group II to V the overall delay from start of symptoms till operation was 55.63 + 8.37 hrs. The cumulative ease to operative was experienced in group V.

Conclusion: In scenario of mass / multiple casualty, the antibiotic containing sulbactum will be best empirical therapy to gain time for patients of acute appendicitis. The one having Cefoperazone has got a definitive edge over the rest.

Keywords: Appendicitis, Cefoperazone, Sulbactum

INTRODUCTION

For over a century now the treatment of appendicitis is appendectomy and is the most frequent cause of abdominal surgery world wide[1]. However as we proceed on timeline medicolegal implications are sprouting. The old blind faith in surgeons is being replaced with more objective assessments. This is the reason that the delay in appendectomy has become a sensitive issue and a lot of scoring systems have surfaced[2-4]. The patient is operated as soon possible after the diagnosis of appendicitis. This is the usual practice all over the advanced / well manned centers. In peripheral less equipped and inadequately manning levels as our hospital the triage of operating patients becomes a sensitive issue especially when patients requiring urgent laparotomy are on waiting lists and patients of acute appendicitis too being innumerable. This is also a known fact that the delay in presentation on part of patient is usually not associated with increased morbidity but physician delay in simple appendicitis is a more likely contributing possibly to, increased morbidity[5]. These range from simple adhesions through mass formation and abscess formation to life threatening complications of peritonitis, portal pyaemia or portal vein thrombosis[6]. In all such situations time is gained by placing the patients on intravenous antibiotics and it is studied that an elective overnight stay is not significantly harmful[7]. If this approach is adopted in patients of acute catarrhal appendicitis and the disease goes into remission and resurface as recurrent acute appendicitis in the under treated subset of population[8].

The scope of this study is only applicable in the peculiar settings of mass casualty management as at our hospital where we are

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confronted with a grave situation of resource constraints in terms of manpower and an ever increasing and demanding dependant population. CMH Rawalakot is a secondary care centre with a dependant population of 1.5 million.

In such a situation particularly post earth quake the appendectomies have to be rationalized so as not to exhaust the OT staff and always to keep reserve energies for the multiple / mass casualties of Road traffic accidents, landslides and unexpected war injuries from the Forward Defence Lines. These of course have to be managed by the same Surgeon and the same OT staff. When we had a sudden surge of patients, logically after triage, the patients were operated and I/V antibiotics are administered to those in the waiting list. Facing this dilemma the correct choice of intravenous antibiotics plays a key role in decreasing the patient morbidity / operative difficulties while a delay is encountered in appendectomy. This incited the search for an appropriate antibiotic approach for gaining time before surgery such that minimum difficulty is encountered during the surgical procedure. Extreme care has been taken so that this approach was only adopted in patients where the delay in appendectomy was inevitable.

PATIENTS AND METHODS

This is a Quasi-experimental study which has been conducted at CMH Rawalakot for period of 1 year from 15 Jan 2007 to 15 Jan 2008. We considered adult patients age more than 12 yrs of both sex and all races presenting to our hospital. Patients were included on the basis of convenient sampling. All patients were evaluated with thorough history, clinical examination, blood CP and Urine RE. USG abdomen was carried out in patients suspected to have mass formation on clinical examination. All patients were diagnosed preoperatively to be suffering from appendicitis on the basis of Alvarado's Scoring system. The patients included in the study were having an Alvarado of 4 or more. Only those patients were included in the study in which the delay from time of onset of symptoms to operation was 48 – 84 hrs i.e. initial inflammatory process had begun but were not provided timely treatment. This lag was either due to delay in presentation or due to non-avail of OT space. Patients who had developed appendicular mass were excluded from the study.

Groups were defined as given in Table-1. Group one was taken as control and consisted of patients who reported to us in the natural course of the disease after 48 hrs to 72hrs of onset of symptoms, had not received antibiotics. These patients were operated within 12 hours of hospital admission. Group II, III, IV & V included patients who reported early within 24 hrs, were diagnosed to be suffering from acute appendicitis but could not be operated because of non availability of OT space. These patients received various antibiotic combinations within 24 hours of onset of symptoms and patients were subsequently operated 24 to 72 hours after onset of symptoms. The grade of operative difficulty was assessed objectively according to the criteria as outlined in Table No. 2. All the groups were compared on the basis of the difficulty score. Then each group was assessed against a constant normal operative difficulty score of 2.

Statistical Analysis:

Data had been analyzed using SPSS version 15. Descriptive statistics were used to describe the variable. One sample t-test was used to compare the average difficulty score of each group with a constant difficulty score at 2. Ahalysis of variarice (ANOVA) had been used to compare the groups with each other P-value<0.05 was considered as significant.

RESULTS

In one year period 431 appendectomies were performed. Out of these initial 10 patients who had a delayed presentation were included in group I, thereafter at 40 occasions i.e. 10% of time we encountered an inevitable delay, where antibiotic cover was used to gain time. Overall male to female ratio was 27:23, group wise comparison is made in fig. 1 (P>0.05). Average age was 25.14 + 7.54 All the groups were comparable with respect to age (P->0.05) (Table -3). In Group I the appendectomy delay was according to the natural history of the disease

with an average delay between start of symptoms and operation was 57.6 + 12.39 hrs. In Group II to V the overall interval from start of symptoms till operation was 55.63 + 8.37 hrs.

Average difficulty scores for all the groups were given in table 3. When the average score of each group was compared with normal operative difficulty score of 2 only group V had insignificant difference while groups 1-IV had significantly different scores from 2. Group wise comparisons of average difficulty score were given in table-4.

Table-1: List of Groups

Group I	No Antibiotics
Group II	Ampicillin / Gentamicin / Metronidazole
Group III	Ceftriaxone / Metronidazole
Group IV	Amoxycillin / Sulbactum
Group V	Cefoperazone /Sulbactum

Table-2: Objective assessment of the operative difficulty

Score	Adhesions Peritoneal / Omemtal	Pus / Abscess	Bleeding
1	Less than ½ of Appendix adherent / Omemtum adherent to tip only	Pus in the appendicular lumen	Only soaked I swab
2	More than half of appendix adherent	Localized purulent exudates only	Ooze soaked more than I swab but did not require packing or diathermy
3	Completely embedded in peritoneum / Omentum engulfing the appendix	Frank abscess/purulent peritonitis	Frank bleeding Required packing or diathermy

Table-3: Statistical Analysis of Different Groups

Group	Mean Age	SD	Avg Dif Lvl	p Value of operative difficulty Against Diff Lvl 2
I	24.8	8.2	6.3	---
II	24.5	8.0	4.3	<0.05
III	24.9	7.1	4.2	<0.05
IV	24.9	7.3	3	<0.05
V	26.6	8.4	2.6	0.051
P-value	>0.05	>0.05		

Table-4: Comparison of various groups amongst each other

Comparitive Groups	p Value
I & II	<0.05
I & III	<0.05
I & IV	<0.05
I & V	<0.05
II & III	1.0
II & IV	0.15
II & V	<0.05
III & IV	0,21
III & V	<0.05
IV & V	0.95

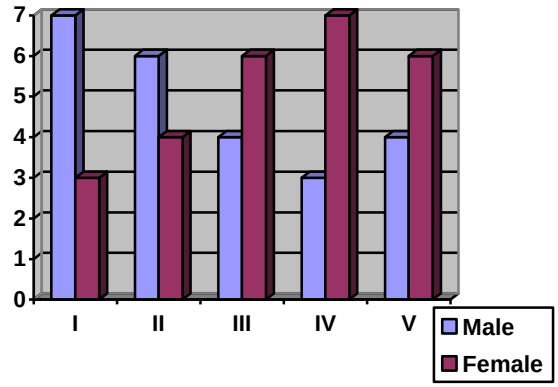

Fig. 1: Male to Female ratio of different groups

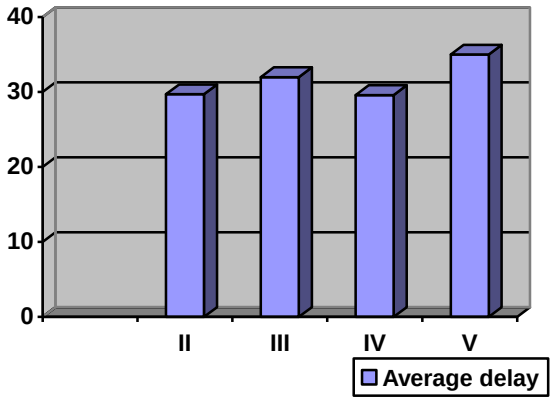

Fig. 2: Comparison of average operative delay after admission

DISCUSSION

Acute appendicitis is probably been the one of the most frequently and hotly debated pathologies so far. Still there are many avenues undisclosed. The one we encountered in earthquake stricken areas of Azad Jammu and Kashmir, was the handling of acute appendicitis patients in a mass casualty situation. In the post earthquake scenario when all the relief agencies have withdrawn, the hospital is being run in a limited capacity cracked building. This situation has led us to the avenue of finding group of antibiotics best suited to gain time before appendicectomy so as to have the least operative difficulty.

The natural course of Acute appendicitis starts as the appendix gets inflamed due to infection or as a result of congestion due to faecolith obstruction of the lumen. This inflammatory reaction leads to local peritoneal reaction and exudation of inflammatory fluid. This stimulates migration of omentum, adhesion and mass formation. Concomitantly there is swelling and pus formation in the appendix. If the inflammation is not localized by the inflammatory and omental reaction, this spreads and may lead to frank pus formation, generalized peritonitis, pylephlebitis, necrosis of caecal wall or septicaemia. In this study we aimed to help the natural defence mechanism after about 24 hrs of onset of symptoms, till the time of operation. This help was provided with various regimens of antibiotics as described in groups II-V. The results were then evaluated objectively as per the criteria mentioned in patients and methods.

The spectrum of various organisms covered by the antibiotics can be consulted from standard pharmacology books. We have seen that when used in combination the various groups cover almost equal spectrum of organisms. Huesh PR and Hawkey PM recommend the use of ampicillin/sulbactam or cefoperazone-sulbactam in mild-to-moderate cases of Complicated Intra-Abdominal Infections (IAIs) when single agent therapy using the beta-lactam/beta-lactamase inhibitors is adopted[9].

In our study mean significant change was observed in the aggregate of the difficulty score. This gradually decreased down the group sequence, indicating that the stronger the antibiotic combination greater time can be achieved before going for operative procedure. Moreover lesser difficulty is encountered down the groups. The difference in difficulty score of each group against a normal operative difficulty score of 2 remained to be <0.05 in all groups except group V, treated with cefoperazone and sulbactum. When the groups were compared amongst themselves we found that all stand significant difference when compared with group I while there is no significant difference amongst groups II & III. Group IV has no edge over group II and III but Groups V has statistically significant difference from groups II and III. When the sulbactum containing antibiotics are compared amongst each other we find that there was insignificant difference between Group IV and V.

The objective criteria which we have defined can give us a good idea of the facts we have discovered. The addition of sulbactum and cefoperazone provides a statistically significant edge to the group V. This is reflected in the results by the ease in performance of the operation. Beyond doubt the combination with sulbactum proved beneficial. This seems more because of the fact that sulbactam inhibits the Lactmases of the bacteria and make them more susceptible to the action of accompanying antibiotic. Danzinger LH et al studied that the disposition of cefoperazone / sulbactam is altered in patients of acute appendicitis. Compared with data from healthy volunteers, cefoperazone exhibits a decreased clearance, increased steady-state volume of distribution (Vssd) and t1/2 beta in patients with acute appendicitis. An increased Vssd also was observed for sulbactam[10]. An interesting detail is given in the official Ampicillin / Sulbactum FDA Information and is quoted here. It compares the concentration of ampicillin and sulbactum in the different body fluids & tissues. The study indicates that the concentration of sulbactum in the appendicular tissue is much higher in comparison to other body tissues and in comparison with Ampicillin when both are

given in equal doses[11]. This may be the contributing factor why combination containing sulbactum are more effective. The ease encountered in the Group V may be because of the additional action of cefoperazone against pseudomonas, but the exact elaboration of the cause is beyond the scope of this study and will require research at a better equipped hospital and laboratory.

CONCLUSION

It is hereby concluded that in very specific mass casualty scenario if one has to gain time before appendicectomy the antibiotic containing sulbactum and cefoperazone will be better than the rest. However if this compared with antibiotic group having sulbactum and ampicillin it is not statistically different.

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