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URGENT VERSUS EARLY ELECTIVE APPENDICECTOMY: THE CHANGING SCENARIO OF MIDNIGHT APPENDICECTOMY

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ABSTRACT: Appendicectomy is one of the emergencies, dealt most frequently by a surgeon. A surgeon's training, in earlier days, was judged by his progress in appendicectomy. With time, increasing patient load, more ultrasound diagnosis of appendicitis and introduction of laparoscopy, this training protocol was lost and transformed to "leaving appendicitis for residents" at night. Due to lack of discipline, supervision and resident's awareness about minute details of procedure, urgent appendicectomy showed more complication rate. This study was undertaken, to statistically prove the difference, if any between same evening or midnight appendicectomy and early morning appendicectomy.

KEYWORDS: Urgent, early elective, appendicectomy.

INTRODUCTION: Appendicectomy is one of the most common operations performed as an emergency. The operation has traditionally been delegated to relatively junior doctors and competency is usually seen as a sign of the junior's progress. In earlier days, any patient with acute appendicitis was operated within four hours to prevent complications. With advent of better antibiotics, better diagnostic modalities, better surgical skills and better operative equipment's with better understanding of pathophysiology of appendicitis, appendicitis can now be conserved overnight and appendicectomy performed, the next morning. This alteration in protocols has reduced the complication rate and has provided better residents' and patients' acceptability. Very few studies have been undertaken in this direction. This study was undertaken, to prospectively analyze the complication rate and recovery parameters of urgent and early elective appendicectomy and statistically prove differences between two.

MATERIALS AND METHODS: The study was conducted at a rural tertiary hospital from June 2011 to December 2012, as a prospective, randomized, comparative, analytical study. 200 consenting patients, fulfilling the inclusion criteria, were considered for study. 100 patients who were operated the same day or after midnight, till 8 am next day were included in urgent group, while 100 patients who were operated only after 8 am next day, and kept conservative overnight, were included in early elective appendicectomy. The cases were randomized, by day of admission to hospital, as per treating unit protocols.

The inclusion criteria were all cases of clinically proven acute appendicitis, in whom other causes had been ruled out by ultrasonography. The exclusion criteria were gangrenous appendicitis, perforated appendicitis, obstructive variety of appendicitis and appendicular tumours as proven by USG. Most patients in urgent group received spinal anaesthesia, except for few children and failed spinal cases, in whom general anaesthesia was given.

The time required for surgery was noted from skin incision to skin incision in urgent group and from time of insertion of umbilical port to removal of all the ports with skin closure in early

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elective group. Patient was started on oral liquids, soon after return of bowel sounds and peristalsis. Duration of first requirement of analgesic (in hours) was calculated as time when patient first asked consciously for pain relief after reversal of general or spinal anaesthesia. Ambulation was determined by time duration after operation that the patient took to get up out of bed on his own.

The postoperative antibiotic and analgesic requirement (Whether injectable or oral) was calculated in days. The injectable antibiotic used was ceftriaxone and sulbactam while oral antibiotic was cefixime. The analgesic used was diclofenac. The pelvic drain was removed when charting was less than 50 ml in decreasing order with no blood or bile leak. Patients were followed for six months. Early and late complications were recorded. The residents' preferences for midnight appendicectomy were judged by a questionnaire. There were 12 residents who were rotated in all four units during two years period and cumulative response was asked regarding urgent appendicectomy.

All values were expressed as mean+standard deviation (except the values of the converted group which were expressed as mean). The significance of difference between the comparative parameters of urgent and early elective appendicectomy group was tested using Z test (as the sample size was more than 30 with 95% confidence interval). P value <0.05 was considered significant and P value < 0.01 was considered highly significant. All the parameters were statistically analysed using EPI6 INFO programme.

RESULTS: Most of the patients in either group i.e. urgent appendicectomy and early elective appendicectomy were females (68% and 76% respectively). 58% patients in urgent appendicectomy group and 57% patients in early elective appendicectomy group belonged to 10-30 years age group indicating that appendicectomy is more common in young.

Of all those, who underwent appendicectomy, the same day, 64% were admitted in time frame of 6 pm to 12 midnight, while 20% were admitted in time frame of 12 midnight to 8 am. In early elective appendicectomy, 50% were admitted in between 6 pm to 12 midnight, while 36% were admitted between 12 midnight to 8 am, indicating approximately equal evening and night load of patients in either group.

The consultant surgeon operated only 13 patients at evening and 7 patients at night, in urgent group (the ones which were complicated). 61% patients were operated by 3rd year registrar and 19 % patients were operated by 2nd year residents. The consultant surgeon occasionally supervised only for brief period during these resident's operations. All patients i.e. 100% in early elective group were operated or assisted by consultant or senior consultant. The consultant anaesthetist appeared in only 10 evening operated and 5 night operated patients of urgent group, while their services were provided to all the patients operated in early elective group. OT technician was present in only 5 evening operated cases of urgent appendicectomy group.

All urgent appendicectomy group patients were operated by open method because of non-availability of OT technician at evening and night, while only 7% patients in early elective group were operated by open method (the converted group) and remaining 93% patients were operated laparoscopically. The duration of surgery was four times more in urgent group as compared to early elective group (48.13+12.12 min UA vs 12.64+7.16 min EEA, p<0.01) indicating more reaction time of residents in former due to overwork and lack of sleep.

73% patients in urgent group received spinal anaesthesia and 27% patient received general anaesthesia, while all patients in early elective group received general anaesthesia. The anaesthesia induction time was approximately four times more in urgent group as compared to early elective

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group (25 min vs 7 min, median, $p<0.01$) indicating lack of confidence due to absence of consultant backup, poor judgment with poor reflexes and coordination, especially at late midnight. Similarly, the anaesthesia reversal time for urgent group was twice that of early elective group. (20 min vs 10 min, median, $p<0.05$).

86% patients in urgent group received only one dose of antibiotic before they were taken to OT, while 14% were fortunate to receive two or more than two dose of antibiotic because of some delay in taking to OT. Majority of patients (92%) in early elective group received two or more than two doses of antibiotic, because of overnight conservative management. The delay in surgery with more antibiotic coverage in early elective group resulted in less infection rate and less intraoperative adhesions, tissue handling and dissection.

The mean NBM status was for more duration in urgent group (28.20+2.54 hrs UA vs 6.46+2.14 EEA, $p<0.01$) indicating early return of bowel sounds and peristalsis in early elective group. The urgent group demanded analgesic earlier at 4.86+1.31 hrs in contrast to early elective group, who demanded at 8.76+0.99 hrs ($p<0.05$). The mean postoperative analgesic requirement (injectable or oral) as demanded by patients for their pain relief was more in urgent group (5.23+2.71 days UA vs 2.23+1.32 days EEA, $p<0.01$). The postoperative antibiotics was given for a mean of 7.35+3.61 days in urgent group as compared to 2.94+1.81 days in early elective group ($p<0.05$). The mean time of ambulation, by patient on its own, was delayed in urgent group (21.32+2.75 hrs UA vs 8.05+1.60 hrs EEA, $p<0.01$). Drain was kept in total 15 patients in urgent group and only two patients in early elective group. Urgent group had to stay in hospital for a mean of 5.95+1.97 days in contrast to 2.87+0.96 days in early elective group.

Considering urgent appendicectomy, adhesions were encountered in 12% of patients (3% in early elective). Bleeding while dissecting appendix was seen in 15% of patients (2% in early elective). Wound infection was more to extent of 16% in contrast to 2% in early elective group. Abscess and enterocutaneous fistula secondary to caecal perforation was seen in 3% of patients. Scar pain due to nerve entrapment or injury was seen in 5% of patients. None of the patients in early elective group showed these complications. There was no mortality in either group.

When residents preferences were asked by a questionnaire, regarding midnight vs early morning appendicectomy, all 12 residents refused to operate with lack of sleep and after heavy evening emergency. Given the condition of rest during evening hours, two residents were ready to operate after midnight, in their urge to learn more, while 10 still refused to operate after midnight. 9 worried to contact senior staff during problems at night, while 3 had no such problem. 10 residents felt that they were operating with lack of proper training, guidance and supervision. 10 residents felt pressurized not to leave emergency matter till next day, as per the unit protocols. All 12 resident felt that patient preparation was poor, while operating at evening and night.

When patient's preferences were asked by a questionnaire, 92% patients were not able to sleep properly in urgent appendicectomy group, due to whole night spent in preparation, radiological investigations, shifting from one ward to another, informing other family members and taking decisions regarding immediate surgery, apart from bearing pain of appendicitis. Only 13% patients in early elective group were not able to sleep properly due to pain.

DISCUSSION: Appendicectomy is still a commonly performed emergency procedure, the principal indication being a suspicion of acute appendicitis. In early days, prior to era of good antibiotics, complications like perforation and abscess formation were common and every case of appendicitis

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was considered an emergency and taken for surgery within four hours.¹ But today, with improvement in surgical techniques, antibiotics and suture materials, appendicectomy can be operated electively, the next day, without an increase in postoperative complications.

Most of the cases of appendicitis, in this study, presented in evening or at night. Mark RJ Lansdown and McLean AD et al, in their study, also concluded that maximum patients presented after 6 pm till next day 8am and that interventions by active surgical team from 6 pm till 8am next morning, can negatively alter complication rate, morbidity and mortality.²

According to a study by NCEPOD (National confidential enquiry into patient outcome and death)¹ it was found that consultant surgeons were less frequently available, particularly after 6 pm. In their absence, senior house officers performed one third of procedures in adults without senior consultant help in theatre. The same was true with children. They concluded that, wherever possible, appendicectomy should be done between 8 am till 6 pm evening; all patients coming with acute appendicitis at night, seldom require surgery at night, unless complications supervene. It was also shown that, these patients responded well to antibiotics overnight, and allowed easier dissection next day. Most appendicectomies are now performed during the day and afternoon in day care surgeries.¹

In the current study, consultant anaesthetist were present in only 10 out of 16 evening appendicectomies and 5 out of 84 night and midnight appendicectomies, rest all were managed by residents anaesthesiologists. Mark RJ et al also concluded in his study that, during midnight appendicectomies, children aged 5–15 years were anaesthetised by relatively junior staff and for adults, a consultant anaesthetist was only present for 28% of cases, that also on call and during complications. Consultant anaesthetist were more readily available during daytime hours, which in turn also reflect lack of training of work loaded junior residents at midnight.²

All urgent appendicectomies were performed by open method, due to non-availability of OT technicians (The instrument care taker), while patients in early elective group (93%) enjoyed laparoscopic appendicectomies, by hands of consultant surgeons. They had further added advantages of early start of oral feeds, early ambulation by self, less requirement of postoperative analgesics and antibiotics and decreased postoperative hospital stay. Only two patients had drain kept in early appendicectomy group, reflecting proper hemostasis, less dissection and adhesions, control of inflammation by overnight antibiotics (Two or more dose) and sound judgment by senior consultants. However, 15 patients in urgent appendicectomy group had drain kept, reflecting hastiness to complete operation without adequate hemostasis. A study by Namir Katkhouda also concluded all above benefits in laparoscopic group.³ Mark RJ et al also concluded that less than 10% operations were performed laparoscopically, in urgent appendicectomy, due to lack of consultants.

The operative time required in urgent open appendicectomy should be less than operative time required in early elective laparoscopic appendicectomies, as has been proved by studies of Fingerhut A et al,⁴ McCall JL et al⁵ and Namir Katkhouda.¹ However, in present study, the duration of surgery in urgent appendicectomy was approximately four times that of early elective laparoscopic appendicectomy. The reasons were decreased reaction time of operating residents due to lack of sleep, extra cautious approach due to no backup by consultants, lack of proper training before they actually got surgery and lack of coordinated movements among operating surgeon and assistants.

The non-prepared mental status, to complete a task rather than enjoy a task was also a reason for increase in operative time.⁶

The anesthesia induction time was three times more, while anesthesia reversal time was twice more in urgent group, reflecting delayed reaction time among anaesthetist residents also. Most

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of the time, this delay was also due to non-availability of attendants for patient positioning, non-availability of right anesthetist drugs and equipment's and unprepared trolley, which had exhausted after whole day's surgery.

The complication rate was more in urgent open group as compared to early elective group, despite seven lap assisted open appendicectomies, being performed in early elective group. The common complications, seen more in urgent group, were adhesions, due to less antibiotic cover, bleeding due to quick, uncoordinated, rough dissection and inadequate hemostasis and wound infection due to poor patient preparation and poor sterilization of OT after day's procedure.^{7,8} Enterocutaneous fistula, due to caecal perforation and pelvic abscess was more in urgent group. Two of the residents had directly opened caecum, thinking it to be peritoneum and one resident had created fistula while dissecting densely adherent inflamed appendix. Scar pain was more in muscle cutting incision of urgent group, due to nerve entrapment and nerve severing.⁹

Resident's did not prefer midnight appendicectomies. A questionnaire, developed to judge the mental status of the working residents, proved the same. The broad opinion was that residents felt that they were not properly trained, but still had to operate with lack of sleep and with a fear not to complicate the case. They felt need of supervision, which was not available at midnight, felt pressurized to complete the emergencies before routine OT, the next day and simultaneously were afraid to contact their consultant staff during problems.

Mark RJ Lansdown et al also concluded in his study that even open apendicectomies could be performed in early elective group, which would help consultants passing on their skills to junior staff. The junior surgeons, under supervision, then become well versed to deal with difficult case as well as routine.² Diagnostic laparoscopy, for uncertain cases and decision to operate on clinical grounds or confirmation of appendicitis, is also possible with early elective appendicectomy.¹⁰ Seewey KJ et al concluded that most patients who undergo a laparoscopic appendicectomy do so with a consultant present. If more urgent open appendicectomies are performed, few registrars become competent at laparoscopic appendicectomy during their training.¹⁰

A Cochrane Review of 45 randomised trials demonstrated that the greatest barrier to a more generalised use of laparoscopic approach, by residents, is difficulty reaching competence during resident training.¹¹ They concluded that a paediatric surgeons may only perform on average 1.6 laparoscopic procedures and assist 2.3 each year during their 6-year training.¹² If further research supports a move towards laparoscopic appendicectomy, the current workforce will not have been adequately trained for this approach. The patient's preference was also more for early elective group because they got more time to deal with their family members, to accept their disease, to sleep well before next day surgery and to mentally prepare themselves for surgery, especially the young, unmarried female population, who are most affected by the disease, apart from getting the added advantages of laparoscopic surgery.

CONCLUSION: Early elective surgeries should be promoted for all cases of acute appendicitis except the perforated, gangrenous and obstructed group and midnight appendicectomy should be abandoned. The waiting period, overnight with antibiotic coverage, decreases odema, adhesions and prevent complications, thus decreasing overall morbidity, hospital stay and hospital cost. It also mentally prepares residents for next day surgery, who are well equipped, fresh, confident in their procedure due to backup and confident in calling senior during problems.

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The patient preparation with reports is also better, no decision is hastily, no appendicitis is over diagnosed, preventing unnecessary operations and patients receive adequate dose of antibiotics, before surgery apart from getting added advantages of laparoscopic surgery. The anaesthetist also are well oriented with a better reaction time and good reflexes, and work willingly without being forced by situation. Early elective appendectomy did not alter the complication rate, instead decreased it.

REFERENCES:

1. Campling EA, Devlin HB, Hoile RW, Ingram GS, Lunn JN. Who Operates When? London: NCEPOD; 1977.
2. Mark RJ Lansdown, Anthony JG Gray, Tom Treasure, Graham T Layer. Appendectomy: Who Performs it, When and How? *Ann R Coll Surg Engl.* 2006 October; 88(6): 530–534.
3. Namir Katkhouda, Rodney J. Mason, Shirin Towfigh, Anna Gevorgyan. Laparoscopic Versus Open Appendectomy A Prospective Randomized Double-Blind Study. *Ann Surg* 2005; 242: 439–450.
4. Fingerhut A, Millat B, Borrie F. Laparoscopic versus open appendectomy: time to decide. *World J Surg.* 1999; 23: 835–845.
5. McCall JL, Sharples K, Jadallah F. Systematic review of randomized controlled trials comparing laparoscopic with open appendectomy. *Br J Surg.* 1997; 84: 1045–1050.
6. Sauerland S, Lefering R, Neugebauer EA. Laparoscopic versus open surgery for suspected appendicitis. *Cochrane Database Syst Rev.* 2002; (1):CD001546.
7. Slim K, Pezet D, Chipponi J. Laparoscopic or open appendectomy? Critical review of randomized, controlled trials. *Dis Colon Rectum.* 1998; 41: 398–403.
8. Katkhouda N, Friedlander MH, Grant SW, et al. Intraabdominal abscess rate after laparoscopic appendectomy. *Am J Surg.* 2000; 180: 456–459.
9. Paik PS, Towson JA, Anthone GJ, et al. Intra-abdominal abscesses following laparoscopic and open appendectomies. *J Gastrointest Surg.* 1997; 1: 188–193.
10. Sweeney KJ, Keane FBV. Moving from open to laparoscopic appendectomy. *Br J Surg.* 2003; 90: 257–8.
11. Sauerland S, Lefering R, Neugebauer EAM. Laparoscopic versus open appendectomy for suspected appendicitis. *Cochrane Database Syst Rev.* 2002; 1: CD001546.
12. Milliken IM, Dick AC. Trends in training in paediatric laparoscopic surgery. *Ann R Coll Surg Engl.* 2004; 86: 229.

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URGENT VS. EARLY ELECTIVE APPENDICECTOMY:

Age(in years)	Urgent Appendicectomy		Early Elective Appendicectomy	
	Male	Female	Male	Female
< 10	2(2%)	12(12%)	3(3%)	15(15%)
10-20	10(10%)	31(31%)	9(9%)	32(32%)
20-30	8(8%)	9(9%)	5(5%)	11(11%)
30-40	5(5%)	7(7%)	3(3%)	8(8%)
40-50	4(4%)	5(5%)	2(2%)	6(6%)
>50	3(3%)	4(4%)	2(2%)	4(4%)
Total	32(32%)	68(68%)	24(24%)	76(76%)

Table I: showing age and sex distribution of patients

Time duration	Urgent Appendicectomy	Early Elective Appendicectomy
12pm – 6pm	16(16%)	14(14%)
6 pm – 12 MN	64(64%)	50(50%)
12 MN – 8 am	20(20%)	36(36%)

Table II: Patient presentation to hospital

Staff	Urgent Appendicectomy (no. of patients)			Early Elective Appendicectomy (no. of patients)
	Evening	Night	After Midnight	Day
Consultant Surgeon	13	7	0	100
Consultant Anaesthetist	10	5	0	100
Registrar 3 operating	2	47	12	-
Registrar 2 operating	1	10	8	-
OT technician	5	0	0	100

Table III: Seniority and staff at time of operation

Intraoperative Parameters	Urgent Appendicectomy	Early Elective Appendicectomy	P value
Open appendicectomy	100	7 (converted)	
Lap appendicectomy	0	93	
Duration of surgery (min)	48.13+12.12	12.64+7.16	P<0.01
Anaesthesia Induction Time (min)	25(20-30)	7(5-15)	P<0.01
Anaesthesia Reversal Time (min)	20(15-30)	10(5-15)	P<0.05
Anaesthesia used	73 (SA), 27 (GA)	100(GA)	

Table IV: Mode of Surgery and Intraoperative parameters

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Dose of Antibiotic	Urgent Appendicectomy	Early Elective Appendicectomy
One dose	86(86%)	8(8%)
> 2 dose	14(14%)	92(92%)
Total	100	100

Table V: Duration of injectable antibiotic before surgery

Parameters	Urgent Appendicectomy	Early Elective Appendicectomy	P value
Mean NBM status (hrs)	28.20+2.54	6.46+2.14	P< 0.01
Mean time of ambulation (hrs)	21.32+2.75	8.05+1.60	P<0.01
First requirement of analgesic on demand (hrs)	4.86+1.31	8.76+0.99	P<0.01
Postoperative analgesic requirement (days)	5.23+2.71	2.23+1.32	P<0.01
Postoperative Antibiotic requirement (days)	7.35+3.61	2.94+1.81	P<0.01
Drain kept (no of pts)	15	2	
Hospital stay (days)	5.95+1.97	2.87+0.96	P<0.01

Table VI: Post-operative parameters in either group

Complications	Urgent Appendicectomy	Early Elective Appendicectomy
Adhesions	12(12%)	3(3%)
Bleeding	15(15%)	2(2%)
Wound infection	16(16%)	2(2%)
Enterocutaneous fistula	3(3%)	0
Abscess	3(3%)	0
Scar pain	5(5%)	0
Mortality	0	0

Table VII: Early and delayed postoperative complications

Questions	No. of residents who answered "yes"	No of residents who answered "no"
Operating with lack of sleep	0	12
Patient operated after midnight	2	10
Worry to contact senior staff during problem	9	3
Felt that they were operating with lack of proper training	10	2
Pressure not to leave matter till next day	10	2
Poor preparation of patient	12	0

Table VIII: Residents preference for questionnaire

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Questions	Urgent Appendicectomy	Early Elective Appendicectomy
Sleep disturbance	92(92%)	13(13%)
Operation on same night preference	16(16%)	13(13%)

Table IX: Patient's preference for questionnaire

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