International Journal of Research in Medical Sciences
Shrivastava A et al. Int J Res Med Sci. 2019 Jul;7(7):2536-2541
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20192578

Original Research Article

Laparoscopic versus conventional open appendicectomy: a prospective comparative analytical study in a tertiary care set up

Anurag Shrivastava[1], Anurag Jain[2]*, Rajiv Jain[3]

[1]Department of General surgery, Ruxmani Ben Deepchand Gardi Medical College, Ujjain, Madhya Pradesh, India
[2]Department of General surgery, Government Medical College, Ratlam, Madhya Pradesh, India
[3]Department of General surgery, Sri Aurobindo Institute of Medical Sciences and Research Centre, Indore, Madhya Pradesh, India

Received: 17 May 2019
Revised: 26 May 2019
Accepted: 29 May 2019

***Correspondence:**
Dr. Anurag Jain,
E-mail: drajptjain@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Present study outlines the outcomes of laparoscopic appendicectomy compared to open conventional appendicectomy in a tertiary care set up with aim to validate advantages and shortcomings of both procedures.
Methods: A series of 80 cases above 18 years of age with clinical diagnosis of appendicitis having Alvarado score of seven and above were studied prospectively under the two groups after proper written consent: Open appendectomy-40 cases, Laparoscopic appendectomy-40 cases. Both groups were compared on grounds of intra-operative complications, additional diagnostic potential, operative time, postoperative analgesia, post-operative complications, length of hospital stay, subjective cosmesis, and return to routine normal activities. Values obtained were statistically analyzed.
Results: The median operative time in Laparoscopic Appendicectomy was 58.22 minutes (range 32.68-85.46 min) as compared to open procedure which took 43.65 minutes (30.36-65.48min) ($P<0.05$). Conversion to open procedure was done in 10% (n=4) of laparoscopic cases. Mean value of postoperative pain by visual analogue scale was low in Laparoscopic Appendicectomy (LA) compared to Open Appendicectomy (OA) ($P<0.05$). Mean post-operative stay (3.2±0.34 days versus 2.3±0.24 days) and surgical site infection was recorded in 10 patients (25%) in OA group and 5 (13.9%) in LA group ($P<0.05$).
Conclusions: It can be concluded that laparoscopic surgery is safe with greater diagnostic potential for additional pathologies and better Subjective cosmesis . But all these merits were at the price of longer operating time and a specialized set up needed for laparoscopy.

Keywords: Alvarado score, LA, OA, Subjective cosmesis

INTRODUCTION

Appendix derives its embryological origin from Caecal bud; which is a diverticulum that arises from the post arterial segment of the midgut loop.[1] Though considered as a vestigial organ appendix can cause significant morbidity. Historically first reported appendectomy was by Claudius Amyand, a surgeon at St. George's Hospital, London in 1735; later on in 1886 Fitz, a professor of medicine at Harvard gave a lucid and logical description of appendix and described in detail the pathological changes, if organ is inflamed and used the term appendicitis.[2] Since then appendicectomy have been one

of most common operation performed by General surgeons. Open appendectomy has withstood the test of time for more than a century since its introduction by Charles McBurney in 1889.[3] The procedure is standardized among surgeons. Open appendectomy is typically completed using a small right lower quadrant incision and postoperative recovery is usually uneventful. Variability in the inflammation process and in the location of appendix are the main causes of operative difficulties in open appendectomy, besides providing only a limited space for abdominal exploration .To overcome these difficulties Laparoscopic appendectomy was first described by Semm in 1983 in Germany.[4] Ever since its introduction, it has been scrutinized for its clinical application and has been ascribed certain advantage and disadvantage over the open technique of appendectomy. The principle purported advantages attributed to laparoscopic appendectomy include thorough visualization of the abdominal cavity leading either to the correct positive or differential diagnosis, localization of an ectopic appendix, diminution of post-operative pain and incisional complication rate, decreased hospital stay and lay-off from activity, better cosmesis. This study was designed to compared above mentioned parameters among patients of laparoscopic and open conventional appendicectomy groups.

METHODS

A prospective analytical observational study was carried out in the department of Surgery Sri Aurvindo Institute of Medical Sciences and Research Centre, Indore, Madhya Pradesh India from July 2014 to August 2015. All patients of age above 20 years of both sexes with clinical diagnosis of acute appendicitis with symptoms for less than 24 hours and no palpable appendicular mass were considered for appendectomy. Such patients were divided into two groups for open and laparoscopic procedure on the basis of simple random sampling assigning odd and even numbers to different groups. Following exclusion criteria were adopted:

- Presence of generalized peritonitis.
- Appendicular lump
- Pregnancy.
- Previous abdominal surgery.
- Presence of any cardiac or pulmonary disorder that would affect the overall prognosis of the patient.
- Any known coagulation disorder.
- When imaging technique such as ultrasound, imaging studies and CT scan (in some cases) revealed some non-appendicular pathology.

All patients were evaluated in detail, including history and clinical examination to assess for other differential diagnosis including menstrual history and gynaecological problems in female patients. The diagnosis of appendicitis and decision for surgery was made if Alvarado score was ≥ 7 on evaluation.[5] In patients where a clinical diagnosis could not be established, abdominal ultrasound and in some cases CT scan of abdomen was performed.

Patients were divided into two groups; Group A (open conventional appendicectomy group) and Group B (laparoscopic group). The nature of the procedure and possible complications were explained to the patients and consent was taken for laparoscopic/open appendectomy and also for general/spinal anaesthesia. Institutional ethical clearance was obtained. All patients were given one dose of ceftriaxone 1gm intra venous and metronidazole 500 mg intravenous as preoperative prophylaxis. Patients with appendicular perforation, pus in peritoneal cavity or wound infection received additional doses of antibiotics based on individual case requirements. The type of anaesthesia to be used was decided by anaesthesiologists while the need for conversion of laparoscopic to open appendectomy was decided by the operating surgeon on the basis of local case findings. All cases of open appendectomy were performed under spinal anaesthesia while all cases of laparoscopic appendectomy were performed under general anaesthesia. For open appendectomy all cases were done using a standard Mc Burney (oblique) or Rocky Davis (transverse) right lower quadrant muscle-splitting incision. The incision was centered over the point of maximal tenderness (Mc burneys point). The appendix was identified and meso-appendix divided, taking care to ligate the appendicular artery securely. All standard aseptic precautions were taken during, before and after the surgery. The terminal ileum, other assessable viscera i.e. ovaries and fallopian tube in females were looked out for any alternative or co-existing pathology, while for laparoscopic appendectomy a foley's catheter was placed in all cases prior to port placement to decompress the urinary bladder. Two ports, each of 10 mm through umbilical and suprapubic position and third port of 5 mm through the left lower quadrant was used. The camera was inserted through the suprapubic port. A window was created in appendicular mesentry and appendicular artery controlled with Cautery. The appendix was ligated, cut and removed through the umbilical port. All accessible pelvic and abdominal viscera were visualized to look for alternative or co-existing pathology. Operating time was considered as the time from the point of making an incision to the time of closure of wound. Standard analgesia was prescribed to all patients as Injection Diclofenac 75 mg intra muscularly, 8 hourly for three doses and thereafter on demand. A visual analogue scale (a 10 cm horizontal line without gradations) to be filled by the patient 24 hours after the surgery was used to indicate the general level of pain during the previous 24 hours. Pain reading was taken after 6 hours of the last analgesic dose. Resumption of diet was taken as the ability to tolerate oral fluid intake. A wound complication meant redness or discharge from wound site. The wounds were checked after 48 hours for the presence of any infection and the necessary measures taken such as drainage of subcutaneous abscess or stitch removal for stitch abscess. They were advised regarding

dressing of the wound accordingly. Suture removal was done after one week in all patients who had no wound infection. Patients in each group were given the same set of instructions to return to normal activity and to work as soon as possible. Patient was discharged from the hospital when he/she tolerated oral meals, was ambulating well, and was afebrile. Duration of hospital stay was considered as the number of days after surgery (day 0 being the day of operation) spent in the ward. Return to normal activity was taken as the ability to pursue daily activity at the same level of intensity, duration and frequency as in the preoperative period. The patients were finally assessed regarding the relief of symptoms with which he\she presented. The data were recorded on the Pro forma which included patient's characteristics (age, sex), operating time (from skin incision to wound closure), and conversion rate to open procedure and intra operative findings (normal, gangrenous or perforated appendix), additional diagnostic potential, postoperative pain, period of hospital stay, post-operative complications, subjective cosmesis and return to routine activities. Follow-up was planned at 1 week for assessment of wound and removal of stitches, second visit (at 2 weeks), and third visit (at 3 month), if second visit was uneventful. Values obtained were statistical analysed. Mean, median, standard deviation and range were used for expressing numerical data. Parametric continuous variables were evaluated by independent sample t tests and chi-square test was used for categorical variables. P value of less than 0.05 was considered statistically significant.

RESULTS

Present study included 80 cases over the age of 20 years, which were studied prospectively under the following groups:

- Open appendectomy (group A)-40 cases
- Laparoscopic appendectomy (group B)-40 cases

Most of the patients were <30 years of age at presentation no=27 (67.5%). The median age was 27.6 and 22.35 years in the open and laparoscopic group respectively, with the range of 21.3 to 52.4 in the open group and 20.6 to 42.8 years in the laparoscopic group (Table 1).

Table 1: Patient characteristics (age).

Age yrs	OA		LA	
	No.	%	No.	%
21-30	27	67.5	29	72.5
31-40	10	25	9	22.5
41-50	2	5	1	2.5
51-60	1	2.5	1	2.5
Total	40	100	40	100
Median Age (range)	27.6 years (21.3-52.4 years)		22.35 years (20.6-42.8 years)	

In both groups appendicitis was more common in male individuals (Table 2). Most commonly diagnosed position of appendix in both groups was retrocaecal (Table 3).

In present study median time for open appendicectomy was 43.65 minutes (range 30.36-65.48 minutes) as compared to laparoscopic procedure which took median time of 58.22 minutes (range 32.68-85.46 minutes) (Table 4).

Table 2: Sex distribution.

Sex	OA		LA	
	No.	%	No.	%
Male	25	62.5	23	57.5
Female	15	37.5	17	42.5
Total	40	100	40	100

Table 3: Position of appendix.

Position of Appendix	OA		LA	
	No.	%	No.	%
Retro. cecal	27	67.5	24	60.0
Pre. ileal	1	2.5	2	5
Post. ileal	2	5	2	5
Pelvis	8	20	9	22.5
Sub. cecal	0	0	0	0
Para. cecal	2	5	3	7.5
Total	40	100	40	100

Table 4: Operating time.

Operation time (min)	OA		LA	
	N	%	N	%
21-40	20	50	3	7.5
41-60	19	47.5	24	60
61-80	1	2.5	8	20
81-100	0	0	3	7.5
101-120	0	0	1	2.5
>120	0	0	1	2.5
Total	40	100	40	100
Median Operating Time (range)	43.65 min (30.36-65.48 minutes)		58.22 min (32.68-85.46 minutes)	

Table 5: Conversion rate.

LA	N	Percent
Completed	36	90
Converted	4	10
Total	40	100

Four patients (10%) out of the forty considered for laparoscopic appendectomy had to be converted to open surgery (Table 5).

Causes of conversion were:

- Retrocecal densely adherent appendix making dissection difficult in two cases.
- Grossly gangrenous appendix with edematous mesentery, getting torn with manipulation leading to bleeding.
- Unsure anatomy due to adhesions.

For analysing pain, a visual analogue scale filled by the patient indicating the level of pain on a graded scale of 0 to 10 was used. the reading was taken after 24 hours of surgery and 6 hours of the last analgesic dose (Table 6).

Table 6: Post-operative pain.

VAS* (Pain)	OA		LA		P value
	N	%	N	%	
0-2	6	15	20	55.6	<0.05
3-4	17	42.5	11	30.5	
5-6	13	32.5	4	11.2	
7-8	3	7.5	1	2.7	
9-10	1	2.5	0		
Total	40	100	36	100	
Mean VAS Score	4.35±1.59		2.50±0.89		

VAS* -Visual Analogue Score

There was significant difference in the incidence of complications between the open and laparoscopic groups; 19 out of 40 (47.5%) patients had complications in the open group while 9 out of 36 (25%) had complications in the laparoscopic appendectomy group. Wound infection was seen in 10 (25%) cases of open appendectomy compared to 5 (13.9%) cases of laparoscopic appendectomy, fever was present in 7 (17.5%) cases of open appendectomy compared to 4 (11.1%) patients in the laparoscopic group respectively, loose stools were present in 2 (5%) of patient in open appendectomy and none of patient in laparoscopic appendectomy (Table 7).

Table 7: Post-operative complications.

Complications	OA		LA		P value
	N	%	N	%	
Wound infection	10	25	5	13.9	<0.05
Fever	7	17.5	4	11.1	
Loose stools	2	5	0	0	
No complication	21	52.5	27	75	
Total	40		36		

Mean post-operative stay in the hospital in the open group and laparoscopic group was 3.2±0.34 days and 2.3±0.24 days respectively. range of stay was 2 to 6 days in the open group and 2 to 5 days in laparoscopic group (Table 8).

No additional findings were detected in open appendectomy. Whereas evidence of abdominal tuberculosis was found in two cases of laparoscopic appendectomy. The diagnosis was confirmed by the histopathological examination of the peritoneal tubercles and the biochemical examination of the ascitic fluid. The evidence of a stricture in the ileum was found in two cases of LA. It was also confirmed to be of tuberculous origin. All these patients were started on anti-tubercular therapy. Pelvic inflammatory disease was diagnosed in one case, Meckel's diverticulum was present in one case.

Table 8: Post-operative hospital stay.

Stay (hours)	OA		LA		P value
	N	%	N	%	
24-48	12	30	26	72.2	<0.05
49-72	16	40	6	16.8	
73-96	6	15	3	8.3	
99-120	3	7.5	1	2.7	
>120	3	7.5	0	0	
Total	40	100	36	100	
Mean postoperative hospital stay	3.2±0.34 days		2.3±0.24 days		

Maximum patients of the LA group were satisfied with their post-operative scars. There was a statistically significant difference between the two groups in this aspect ($p<0.05$) (Table 9).

Table 9: Cosmesis.

Cosmesis	OA		LA		P value
	No.	%	No.	%	
Satisfied	14	35	29	80.5	<0.05
Not Satisfied	26	65	7	19.5	
Total	40	100	36	100	

DISCUSSION

In present study time range for open appendicectomy was 30.36-65.48 minutes as compared to laparoscopic procedure which took 32.68-85.46 minutes, with a median time difference of 14.57 min between both procedures. However, this time range includes the laparoscopic cases where the operative procedure was converted to open surgery. In such cases attempt at laparoscopy has actually increased the operation time considerably. The definitions of operating times in the various randomized controlled trials done so far have been highly variable. However results of our study are in accordance to interpretations drawn by Minne et al, Kum et al, Williams et al, Goudar BV et al, Abdul Razak Shaikh et al. Colombo F et al.[6-11] In present study the time difference that may arise due to difference in time taken for induction of anaesthesia, set up of laparoscopic instruments and Foley's catheterization (for laparoscopic appendectomy) and regional anaesthesia (for open appendectomy) was not considered as there was no standard time limit for these procedures for comparison in different patients , however we do agree with the fact

that time required for preoperative set up is definitely high in laparoscopic setup and so is the cost of laparoscopic instruments and their maintenance.

There was significant difference in the degree of pain between two procedures which is in consistency with the results of some other similar studies by Attwood SE et al, Kum CK et al, Abdul Razak Shaikh et al, Tate JJ et al, Frazee RC et al, which showed that laparoscopic procedure cause significantly less pain to the patient as compared to the open procedure.[7,10,12-14]

In present study, average difference in the mean postoperative stay in the hospital was one day (24 hours) between open and laparoscopic appendectomy groups, open appendectomy patients on an average taking more time than laparoscopic group. Findings of present study are in accordance to Abdul Razak Shaikh et al, Colombo F et al, Ulrich Guller et al.[10,11,20] Here an interesting fact comes three similar studies from different socio cultural environments; Minne et al, reported a median hospital stay in LA as 1.1 days versus 1.2 days in OA group on the other hand Hebebrand et al in Germany reported median stay of 5.3 days versus 7.6 days for same surgeries and Mutter et al, from France reported 5.3 days versus 4.9 days for similar surgeries.[15-17] This implies that this parameter may be affected by hospital or cultural biases rather than reflecting differences due to the technique itself.[18,19]

In an another study by Lejus et al, results revealed significant differences in the postoperative course concerning pain, analgesic requirements and time to normal walking when abscessed versus non-abscessed appendicitis were analysed independent of the technique.[21] This signifies that the post-operative pain, time to return to normal activity and the hospital stay are all related to the severity of appendicitis along with the type of method used for appendectomy. The similar fact has been highlighted by our study where operating time and hospital stay, for cases with severe acute gangrenous appendicitis has much longer than usual cases.

We found significant difference in the post-operative complication rates between the two procedures which is in accordance to interpretations drawn by Abdul Razak Shaikh et al, Ulrich Guller et al, Erikssons et al,[10,20,22] However rate of post-operative complications is highly dependent on the frequency and duration of follow up of patients. Wound infection has been reported as late as 3 months after operation . Similarly, it is difficult to define a wound complication; in literature, it has been mentioned varyingly as purulent discharge' to 'edema' or redness. Another point of bias is that surgeon may not consider redness or soreness of a small laparoscopic wound in the same way as a longer open appendectomy wound. Thirdly, the post-operatives wound complication may be more related to presence of gangrenous or perforated acute appendicitis rather than the type of technique used for its removal.

Of further concern, high rates of post-operative deep abscess have been found with laparoscopy 3.5% by Ortega et al and 3.7% by Martin et al.[23,24] Fortunately enough we did not have to deal with any post-laparoscopic deep abscesses. One retrospective study Ortega AE et al, Tang E et al has suggested that the rate of intra-abdominal abscess may increase for laparoscopy as compared to open appendectomy when performed for perforated appendicitis.[23,25]

Out of 40 cases of laparoscopic appendectomy, in 4 patients the procedure had to be converted to open operation due to technical difficulty (Conversion rate: 10%). It appears that the more difficult cases in terms of severity of appendicitis or subsequent adhesions are the ones most unlikely to be completed with the laparoscopic approach similar interpretations were drawn by Hellberg, Rudberg, Enochsson et al.[26]

In present study six additional pathologies were detected in laparoscopic group with two cases of abdominal tuberculosis. These findings reinforce the use of laparoscopy as an investigational tool. Considering these cases, the diagnostic capability of laparoscopic procedure assumes special significance in our country where tuberculosis is common.

Laparoscopic appendectomy in general had better cosmetic results both subjectively and objectively. The post-operative scars are small and hide easily as compared to a relatively longer scar in the right iliac fossa after open appendectomy.

Our study had some limitations; cost of surgery could not be analysed because as a charitable organization we offer both surgeries at same subsidized cost and as study period was limited we could not evaluate long term complications.

CONCLUSION

On the basis of our study we conclude that laparoscopic appendectomy is a safe, and efficient technique for treatment of acute appendicitis with benefit of better intra-abdominal visualization for additional pathologies, less post-operative morbidity and better cosmesis at a price of high expenses incurred in setting up of laparoscopic setup and its maintenance, which is to be ultimately to be bearded by patient or institute.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Buschard K, Kjaeldguard A. Investigation and analysis of the position length and embryology of

thevermiform appendix. Acta Chirugica Scandinavica. 1973.139(3):293-8.
2. Williams GR. Presidential Address: a history of appendicitis. Ann. Surg. 1983;197(5):495-506
3. McBurney C. Experience with early operative interference in cases of disease of the vermiform appendix. NY Med J. 1889:50:676-84.
4. Semm K. Endoscopic appendectomy. Endoscopy.1983;15(2):59-64.
5. Alvarado A: A practical score for the early diagnosis of acute appendicitis. Ann Emerg Med. 1986;15(5):557-64.
6. Minne L, Varner D, Burnell A, Ratzer E, Clark J, Haun W. Laparoscopic versus open appendectomy. Prospective randomized study of outcomes. Arch Surg. 1997;132(7):708-12.
7. Kum CK, Ngoi SS, Goh PM, Tekant Y, Isaac JR. Randomized controlled trial comparing laparoscopic and open appendicectomy. Br J Surg. 1993,80(12):1599-600.
8. Williams MD, Collins JN, Wright TF, Fenoglio ME. Laparoscopic versus open appendectomy. South Med J. 1996;89(7):668-74.
9. Goudar BV, Telkar S, Amani YP, Shirbur SN, Shailesh ME. Laparoscopic versus Open Appendectomy: A Comparison of Primary Outcome Studies from Southern India. J Clin Diagnos Res. 2011 December;5(8):1606-9.
10. Shaikh AR, Sangrasi AK, Shaikh GA. Clinical Outcomes of Laparoscopic Versus Open Appendectomy. JSLS. 2009 Oct-Dec;13(4):574-80.
11. Colombo F, Andreani SM, Gravante S, Davies A. Laparoscopic vs. open appendicectomies: results obtained by junior surgeons at a British University Hospital. Eur Rev Med Pharmacol Sci. 2012;16:687-90.
12. Attwood SE, Hill AD, Murphy PG, Thornton J, Stephens RB. A prospective randomized trial of laparoscopic versus open appendectomy. Surg. 1992;112(3):497-501.
13. Tate JJ, Dawson JW, Chung SC. Laparoscopic versus open appendicectomy: prospective randomised trial. Lancet. 1993;342(8872):633-7.
14. Frazee RC, Roberts JW, Symmonds RE. A prospective randomized trial comparing open versus laparoscopic appendectomy. Ann Surg. 1994;219(6):725-8.
15. Minne L, Varner D, Burnell A. Laparoscopic vs. open appendectomy: prospective randomized study of outcomes. Arch Surg. 1997;132(7):708-11.
16. Hebebrand D, Troidl H, Spangenberger W. laparoskopische Oder Klassische appendektomie? Eine prospective randomisierte studie. Ghirurg. 1994;65(2):112.
17. Mutter D, Vix M, Bui A, Evrard S, Tassetti V, Breton JF, et al. Laparoscopy not recommended for routine appendectomy in men: results of a prospective randomized study. Surgery. 1996;120(1):71-4.
18. Eldar S, Nash E, Sabo E, Matter I, Kunin J, Mogliner JG, et al. Delay in surgery in acute appendicitis. Am J Surg. 1997;173(3):194-8.
19. Salcedo-Wasicek MD, Thirlby RC. Prospective course after herniorrhaphy: a case-controlled comparison of patients receiving worker's compensation vs patient with commercial insurance. Arch Surg. 1995;130(1):29-32.
20. Guller U, Hervey S, Purves H. Laparoscopic versus open appendectomy: outcomes comparison based on a large administrative database. Ann Surg. 2004;239(1):43-52.
21. Lejus C, Delile L, Plattner V, Baron M, Guillou S, Héloury Y, et al. Randomized, single-blinded trial of laparoscopic versus open appendectomy in children: effects on postoperative analgesia. Anesthesiol. 1996;84(4):801-6.
22. Eriksson S. Acute appendicitis-ways to improve diagnostic accuracy. Eur J Surg. 1996 Jun;162(6):435-42.
23. Ortega AE, Hunter JG, Peters JH, Swanstrom LL, Schirmer B. Laparoscopic Appendectomy Study Group. A prospective, randomized comparison of laparoscopic appendectomy with open appendectomy. The Amer Jof Surg. 1995 Feb 1;169(2):208-13.
24. Martin LC, Puente I, Sosa JL, Bassin A, Breslaw R, Mc Kenney MG, et al. Open versus laparoscopic appendectomy: A prospective randomized comparison. Ann Surg. 1994;222(3):256-61.
25. Tang E, Ortega AE, Anthone GJ, Beart RW. Intra-abdominal abscesses following laparoscopic andopen appendectomies. Surg Endoscop. 1996 Mar 1;10(3):327-8
26. Hellberg A, Rudberg C, Enochsson L, Gudbjartsson T, Wenner J, Kullman E, et al. Conversion from laparoscopic to open appendicectomy: a possible drawback of the laparoscopic technique? Eur J Surg. 2001;167(3):209-13.

Cite this article as: Shrivastava A, Jain A, Jain R. Laparoscopic versus conventional open appendicectomy: a prospective comparative analytical study in a tertiary care set up. Int J Res Med Sci 2019;7:2536-41.