



ORIGINAL RESEARCH PAPER

Surgery

“A STUDY ON GRADING OF POST OPERATIVE COMPLICATION AFTER EXPLORATORY LAPAROTOMY ACCORDING TO CLAVIEN-DINDO SYSTEM”

KEY WORDS: clavier-dindo classification, post-operative complications and surgical site infection.

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ABSTRACT

Aim And Objectives: Post-operative surgical complications are common in every surgery. The compulsive postoperative surveillance is mandatory to identify and address post-operative complications at the earliest with the help of simple, convenient, reproducible and comprehensive logical system. This study is aimed to grade post-operative complications and incidence of wound infection after exploratory laparotomy according to clavier-dindo classification.

Material And Methods: This is a prospective study of 70 patients with acute abdominal conditions who required emergency exploration of abdomen. This study was conducted in VDGMC Latur from December 2019 to May 2021.

Results: Out of 70 patients 46 were males and 34 were females. Mean age of our study population was 49.7 years (range 13-79). Majority of study population had exploratory laparotomy due to gastric perforation (18.6 %) and intestinal obstruction (18.6 %). 11 patients had no complications and remaining 59 patients developed complications. G1 includes 34.2%, G2 includes 25.7%, G3a includes 5.7%, G3b includes 4.3%, G4a includes 9%, G4b includes 1.4% and G5 includes 2.9%. 21.4% patients had surgical site infection and Grade 1 complications were more common in our study.

Conclusion: We concluded that clavier-dindo classification is simple, easy and effective tool useful for analyzing, reporting and addressing complications after exploratory laparotomy for abdominal pathology.

INTRODUCTION

Every surgery in surgical field may be associated with some kind of major or minor complications irrespective of experience and the skill of the surgeon. The absence of a widely accepted ranking system to classify surgical complications, has hampered proper interpretation of surgical outcome data for long time. Thus, to improve the quality of care and to minimize the complications and to manage the post-operative complications, a system of standard classification is needed. Clavier-dindo classification is one of such classification.¹

Terms, such as minor, moderate, major and severe complications have been inconsistently used among authors and centers over a period of time. A number of attempts have been made in 1990s to classify surgical complications but none of them have gained widespread acceptance.²

In 1992, the Clavier-dindo classification originated which was simple and widely used tool to assess and report post-operative complications in general surgery. It was first introduced under the name of the “T92 score” as validated on 650 cholecystectomies. It had seven grades (grade 1-5) with two subgroups for grade 3 and 4.³

After its routine use for 12 years modified version of clavier-dindo classification developed in 2004, with the aim of presenting an objective, simple, reliable and reproducible way of reporting negative events after surgery.⁴ It was again reassessed in 2009 by clavier et al, using complex clinical situations from the University of Zurich's weekly morbidity and mortality conference.⁵

Even Dindo and Clavier produced a new scoring system, the Comprehensive Complication Index (CCI), first published in 2013. As a novelty, this index included the patients' perception of the severity of their complications as well as the physicians and sums up all of the occurring complications, not only the gravest. It also seems to be more responsive to therapy effects and allows a longitudinal assessment of the morbidity.⁶

CLAVIEN-DINDO CLASSIFICATION⁷

GRADES	
1	Any deviation from the normal postoperative course without the need for pharmacological

	treatment or surgical, endoscopic and radiological interventions. Acceptable therapeutic regimens are: drugs as antiemetic's, antipyretics, analgesics, diuretics and electrolytes and physiotherapy. This grade also includes wound infections opened at the bedside
2	Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions, antibiotics and total parenteral nutrition is also included
3	Requiring surgical, endoscopic or radiological intervention
3a	Intervention under regional/local anesthesia
3b	Intervention under general anesthesia
4	Life-threatening complication requiring intensive care/ intensive care unit management
4a	Single-organ dysfunction
4b	Multi-organ dysfunction
5	Patient demise

METHODS AND MATERIAL

It is a prospective study including 70 study population conducted in single center in the department of general surgery VDGMC Latur from December 2019 to May 2021.

All the patients above age of 12 years with abdominal pathology are included in the study, who requires exploration of abdomen. Patients selected for study were evaluated by detailed clinical history and examination, comorbid conditions and history of previous surgeries. Apart from routine investigations specific investigations like x-ray, ultrasonography and CT scan was done depending upon provisional diagnosis and requirement of each patient.

Patients evaluated thoroughly, parameters like operative procedure, length of operative period, post-operative complications and management were recorded. Post-operative complications were classified and in case of multiple complications, grade given to the most severe complication of clavier-dindo grading system.

RESULTS

70 patients diagnosed with abdominal pathology are included in the study after getting consent.

Majority of study population are of age group between 51-60 years which includes 25.7% followed by 61-70 years includes 21.4%, 41-50 years include 18.6%, below 30 years include 14.3%, 31-40 years include 12.9% and only 7.1% cases are of above 70-year age group .Study includes 47 males(67.1 %) and 23 females (32.9%).

60% patients are not having any comorbidities and remaining 40% cases has comorbidities. Majority are having diabetes mellitus(20%), followed by hypertension (11.4%), chronic renal failure (2.9%) and coronary artery disease and tuberculosis includes 1.4% each .1.4% includes hypertension with diabetes mellitus and remaining 1.4% includes coronary artery disease with hypertension.

Majority cases of exploratory laparotomy include gastric perforation and intestinal obstruction, each includes 18.6% followed by jejunal perforation and caecal perforation with appendicular abscess, each includes 12.9%. followed by ileal perforation and splenic flexure mass includes 7.1 % and ascending colon mass includes 5.7%, gall bladder perforation includes 4.3%, duodenal perforation and peritoneal abscess and sigmoid volvulus and blunt trauma with splenic laceration includes 2.9% each, least common are hepatic flexure mass includes 1.4%.

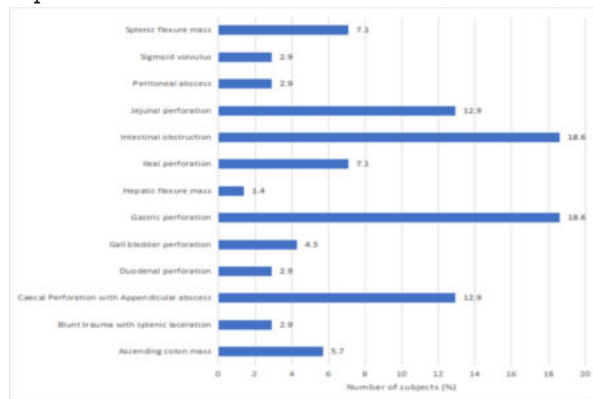


Figure no- 1 Causes Of Emergency Exploratory Laparotomy

In our study 21.4% had modified graham's repair, 20% had right-hemicolectomy, 15.7% had ileo-ileal RA, 11.4% had jejuno-jejunal RA, 8.6% had left-hemicolectomy, 5.7% had ileo-ileal RA with stoma, 4.3% had cholecystectomy and primary repair of jejunal perforation each, 2.9% had splenectomy, sigmoidectomy with end-to-end anastomosis and peritoneal lavage and drainage each.

In our study 15.7% are not having any post-operative complications. Remaining 34.3% patients are having G1 grade, followed by 25.7% having G2 followed by G4a includes 9%, G3a includes 5.7%, G3b includes 4.3%, G5 includes 2.9% and G4b includes 1.4%. Most common post-operative complication includes G1(34.3%) and least common includes G4b (1.4%).

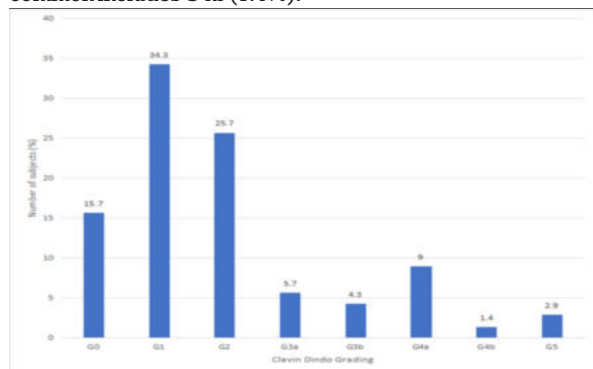


Figure no2 :- Distribution Of Clavien-dindo Grading System

For Post Operative Complications After Exploratory Laparotomy

Out of 70 study population 11 patients (15.7%) did not develop post-operative complication and rest 59 patients developed post-operative complication. Majorities of patients developed wound related complications including wound infection(G1) (15.7%) and wound dehiscence(G3a) (5.7%). followed by 12.9% required blood transfusion(G2), 10% cases developed pneumonia(G2) ,7.1% developed vomiting (G1),5.7% developed post-operative fever(G1), 4.3% developed pulmonary edema(G4a),2.9% developed acute renal failure(G4a), anastomotic leak(G3b), pain(G1), lung atelectasis(G4a), transient rise in creatinine(G1) each. 1.4% patient developed pelvic abscess(G3b), urinary tract infection(G2) and multiorgan dysfunction syndrome (G4b) each and 1.4% patients required total parenteral nutrition(G2) and 2.9% patients died of abdominal pathology(G5).

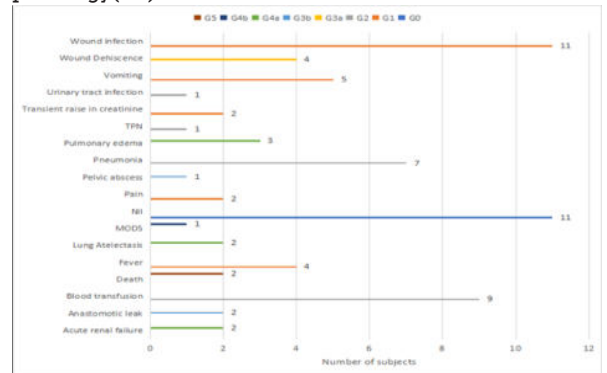


Figure no- 3 Distribution Of Type Of Post Operative Complication After Exploratory Laparotomy.

Incidence of wound related complications include 21.4%. which includes wound infection (15.7%) and wound dehiscence (5.7%)

Majority of males are having G1 and G2 grade (31.9%) each. Females are having majority of G1 grade (39.1%).

Majority of G1 grade complications present in gastric perforation followed by intestinal obstruction. Majority of G2 grade complications are present in caecal perforation with appendicular abscess and jejunal perforation. Majority of G3a and G3b grade complications are present in intestinal obstruction and sigmoid volvulus, G4a grade complications in intestinal obstruction and G4b in ileal perforation. G5 grade complications are seen in intestinal obstruction and sigmoid flexure mass.

DISCUSSION

The present study was undertaken at the tertiary care center with an aim to grade the postoperative complications after exploratory laparotomy according to clavien-dindo grading system. Preoperative, intraoperative and post-operative variables are recorded and studied.

In our study the average mean age of study population is 49.76 years (range 13-79 years) and Mean age for males (51.04 years) and for females (46.86 years). Similar observation seen in the literature conducted by B N Hanumanthappa Et Al,⁸ shows 80 cases undergoing elective major abdominal surgeries with mean age being 43.7 years and males were predominant being 57.5% and mean age of males were 45.89 years and females includes 40.91 years.

In our study out of 70 cases 47 were males (67.1%) and 23 were females (32.9%). The study conducted by Amit-Singh Et Al,⁹ included 350 cases, out of which 270 cases (77.14%) were males and 80 cases (22.85%) were females.

In our study 28 cases (40%) had comorbidities and 42 cases (60%) had no comorbidities. Among which diabetes mellitus was present in majority cases including 20% followed by hypertension including 11.4%. In study conducted by Amit Singh Et Al,⁹ out of 350 cases 49 patients had hypertension (14%) and 37 patients had diabetes mellitus (10.5%).

In our study, 18.6% cases had gastric perforation, followed by 12.9% patients had jejunal perforation and caecal perforation with appendicular abscess respectively and 7.1% had ileal and 2.9% had duodenal perforation. Similar study conducted by Amit Singh Et Al⁹ had 42% duodenal and 8% gastric perforation, 26.2% ileal and 3.14% jejunal perforation and 10% includes appendicular perforation.

In our study, out of 70 patients undergoing exploratory laparotomy, 11 patients were not having complications, and remaining 59 patients developed complications. Majority cases had G1 includes 34.3%, G2 includes 25.7%, G3a includes 5.7%, G3b includes 4.3%, G4a includes 9%, G4b includes 1.4% and G5 includes 2.9%.

similar observations found in the study conducted by Dr Rahul Pandey Et al,¹⁰ in his 318 patients G1 includes 19.4%, G2 includes 19.4%, G3a includes 8.3%, G3b includes 22.2%, G4a includes 11.1%, and G5 includes 19.4%. No G4b complication seen and majority includes G1. Study conducted by Bolliger Et al¹¹ majority includes G3b (27.6%). In Kyung-goo Lee Et al¹² majority includes G3a (12.3%).

In our study 21.4% cases had modified graham's repair for gastric perforation in which 30.7% had no complications and 69.2% had grade 1 and 2 complications and no patients had grade 3, 4 and 5 complications. 20% had right hemicolectomy in which 71.4% had grade 1 and 2 complications and 28.6% had grade 3, 4 and 5 complications.

Similar study conducted by Amit Singh et al⁹ had 8% modified graham's repair for gastric perforation, in which 71.4% had grade 1 and 2 complications and rest 28.5% had grade 3, 4 and 5 complications. And 4.85% had right hemicolectomy in which 47.05% had grade 1 and 2 complications and 52.9% had grade 3, 4 and 5 complications.

In our study splenectomy done in 2 cases (2.9%) and among them one case developed grade 1 complication and other patient did not develop complication, in my study 50% cases of splenectomy developed complication. clavien-dindo grading has been applied to splenectomy cases earlier by Romano Et Al,¹³ in his study 2.8% cases developed grade 1 and 2 complications.

In our study out of 70 study population, Incidence of wound related complications are 21.4%, it includes wound infection (15.7%) and wound dehiscence (5.7%). similar observations seen before in the study conducted by Hanumanthappa Et Al⁸ SSI seen in 21.25% cases.

In our study out of 70 patients, 2 patients have died, belonging to grade 5, similar study conducted by bollinger et al¹¹ shows rate of mortality is 10.3% (grade 5).

In our study out of 70 cases, 4 patients developed wound dehiscence (5.7%) ,2 patients are of fourth decade and 2 patients are of sixth decade, similar study conducted by Garg Ramneesh et al,¹⁴ and they reported highest incidence of wound dehiscence was found to be in patients of fourth decade.

The present study demonstrates that the Patients with higher Clavien-dindo scores (more severe complications) had significantly longer length of stay, as did patients with more complex surgeries, quite similar to the publication from Clavien and Dindo in 2004.

CONCLUSION

The study conducted in tertiary care center shows that Clavien-dindo classification is a simple, easy and effective tool useful for analyzing and reporting complications after exploratory laparotomy for abdominal pathology. Any deviation from normal course following surgery can be easily distinguished by this grading system and it helps to ensure timely initiation of interventions to improve the outcome. The classification has great importance in analyzing the development of complications among various surgeries. This classification is used by most part of the world by surgeons in different centers; implementation of this classification into surgical literature may facilitate in evaluation and comparison of surgical outcomes. In my study Clavien-dindo grade 1 is the most common complication and incidence of wound related complications are more common after exploratory laparotomy for abdominal pathology and most of post-operative complications are present in patients with comorbidities.

REFERENCES

1. Susan G, Uri N, Emilio M, Sara TM, Naim A-F, C. ET. sabiston textbook of surgery the biological basis of modern science. Courtney TM, Mark BE, Daniel BR, Kenneth ML, editors. 2021;1376.
2. Strasberg SM, Linehan DC, Hawkins WG. The accordion severity grading system of surgical complications. *Ann Surg.* 2009;250(2):177-86.
3. Clavien PA, Sanabria JR, Strasberg SM. Proposed classification of complications of surgery with examples of utility in cholecystectomy. *Surgery.* 1992;111(5):518-26.
4. Khan A, Palit V, Myatt A, Cartledge JJ, Browning AJ, Joyce AD, et al. Assessment of clavien-dindo classification in patients >75 years undergoing nephrectomy/ nephroureterectomy. *Urol Ann* 2013;5:18-22.
5. Khuri S F ,etal. The Department of Veterans Affairs 'NSQIP: the first national, validated , outcome-based, risk-adjusted, and peer-controlled program for the measurement and enhancement of the quality of surgical care. National VA Surgical Quality Improvement Program. *Ann Surg.* 1998;228(4):491-507.
6. Slankamenac K ,etal. The comprehensive complication index: a novel continuous scale to measure surgical morbidity. *AnnSurg.*2013;258(1):1-7.
7. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *AnnSurg.* 2004;240(2):205-13.
8. K Dr Sagar, Hanumanthappa BN, Hebsur NI. Clinical Study on Assessment of Post-Surgical Complications According to Clavien-Dindo Classification after Major Abdominal Surgery. *IJSS Journal of Surgery [Internet].* 2018 Jul 30 [cited 2021 Nov 16];4(4):1-6.
9. Singh A, Porwal R, Gupta H, Sharma A, Kumawat G. Determinants of outcome in gastrointestinal perforations with special reference to clavien-dindo classification of surgical complications: Experience of a Single Institute in Central Rajasthan.
10. Arul Jothi, K N, Irusappan S, Amarnath G, Chandrasekaran S, K SAB, Harishankar M, et al. Grading of complications following bowel anastomosis using Clavien-Dindo system: Our experience. *IJSR - International Journal of Scientific Research [Internet].* 2018 [cited 2021 Nov 16];Volume 7 Issue 4(2):63-5.
11. Bolliger M, Kroehnert JA, Molineux F, Kandioler D, Schindl M, Riss P. Experiences with the standardized classification of surgical complications (Clavien-Dindo) in general surgery patients. *European surgery : ACA : Acta chirurgica Austriaca [Internet].* 2018 Dec 1 [cited 2021 Nov 16];50(6):256-61.
12. Lee KG, Lee HJ, Yang JY, Oh SY, Bard S, Suh YS, et al. Risk Factors Associated with Complication Following Gastrectomy for Gastric Cancer: Retrospective Analysis of Prospectively Collected Data Based on the Clavien-Dindo System. *Journal of Gastrointestinal Surgery [Internet].* 2014
13. Romano F, Garancini M, Ciravegna AL, Uggeri F, Degrate L, Maternini M, et al. The implications for patients undergoing splenectomy: post-surgery risk management. *Open Access Surgery [Internet].* 2011 Aug 30 [cited 2021 Dec 9];4:21-34.
14. Ramneesh G, Sheerin S, Surinder S, Bir S. A Prospective Study of Predictors for Post Laparotomy Abdominal Wound Dehiscence. *Journal of Clinical and Diagnostic Research : JCDR [Internet].* 2014 Jan 12 [cited 2021 Nov 16];8(1):80