

Lian-Sheng Ma MD

Editor-in-Chief

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Dear Dr. Ma,

We would like to thank you, and your reviewer's for a thoughtful evaluation of our manuscript entitled "Impact of Frailty on Approach to Colonic Resection: Laparoscopy vs. Open Surgery ". We appreciate the thoughtful critique and have addressed all reviewer comments. All changes in the manuscript are outlined in this response letter and highlighted with bold and italic lettering.

Sincerely,

Timothy Louis Fitzgerald, MD

Reviewer # 02367108

This article has the aim to compare open colorectal surgery to laparoscopic colorectalsurgery and analyse what effect frailty has on the outcome. This is a very important question today as most colorectal surgeons are dealing with the problem to decide if an old and frail patient should be operated or not. There is too little objective knowledge to give to the patients and relatives. In the article frailty is defined as decrease in physiological reserve of multiple organ systems with identifiable altered physical functions beyond what is expected for normal aging. It has been a common believe that, due to long op time, technical challenge, pneumoperitoneum and positioning of the patient the lap colectomy could be dangerous to the frrail patient. To ansvere the question the writers have investigated a cohort of 94 811 patients. The patients were validated with the

modified frailty index and categorized in 4 groups: non-frail (0), mildly frail (1), moderately frail (2), and severely frail (≥ 3). End point: 30 day mortality and complications (major, minor) Subset analysis was performed for patients undergoing colectomy (total colectomy, partial colectomy and sigmoid colectomy) and separately for patients undergoing rectal intervention (abdomino-perineal resection, low anterior resection, and proctocolectomy). The material was stratified on type of operation and frailty score. In the results we see increased mortality and frequency of complications for open surgery compared to laparoscopic surgery and the risk increases as the frailty increases. No difference was detected for colon vs rectal surgery. It seems to be a better choice to offer frail patients laparoscopic surgery than to do open surgery. I like the article and have one comment: In materials and methods you should write out what ACS-NSQIP means, I had to go back and search for the meaning.

Response: Thank you for your observation. We have added definition of ACS-NSQIP to Material and Methods, section data source, line 1

Reviewer 00040584

The aim of the present study was to determine whether laparoscopic surgery is superior to open surgery in the frail. A large nationwide dataset was used for study purposes. Frailty was defined using the Modified Frailty Index. Complications, prolonged LOS and mortality were more common after open surgery compared to laparoscopic approach. The main finding of this study was that with increasing frailty both mortality and morbidity increased, and mortality differences between open and laparoscopic interventions increased. When analyzed separately for colon and rectal surgeries the results were similar. Comments: Increased life expectancy has led to a substantial increase in the incidence of colorectal diseases in the elderly population. Major abdominal surgery in the either chronologically or physiologically older patient carries a

higher risk of morbidity and mortality. The risk of an operation is directly related to the number of identified comorbid illnesses and the physiologic reserve of a patient. Large population-based studies have the power to show clear trends in outcomes. It is well known that frailty increases postoperative mortality and morbidity. This study showed that with increasing frailty both mortality and morbidity increased. Mortality differences between open and laparoscopic interventions increased with increasing frailty suggesting that laparoscopic approach should be the gold standard surgical approach. This finding, however, should be interpreted with some caution because baseline characteristics were not similar. Patients undergoing OC had higher ASA-score indicating more severe comorbidity. Moreover, APRs were performed by open surgery in all patients whereas segmental/total colectomies were performed by laparoscopic approach. Ideally, comorbidity, frailty and the type of procedure should be similarly distributed in both study groups. Also the selection of patients to undergo either open or laparoscopic surgery is unclear. Overall, the results of this study together with the current literature focusing on elderly patients suggest that laparoscopy should be the preferred method for all patients including the frail.

Minor comments: It would be interesting to see the correlation of frailty and longer term mortality (up to 1 year) which is known to be high in elderly patients undergoing colorectal surgery.

Response: Thank you for your thoughtful response, unfortunately ASC-NSQIP does not have longer term mortality.

There are some errors in the writing, which should be corrected.

Response: We apologize, a resident for whom English was a second language prepared the original manuscript. This has been reviewed, and the following changes were made:

The summary was revised; Introduction paragraph 1 lines 3-8, paragraph 2 lines 3-4, paragraph 3 lines 3-4; Materials and Methods section Definition of Frailty line 3, section End Point lines 3-5; Results section Dataset characteristics lines 2,4, and 11; section Patient Demographics paragraph 2 lines 1-5 and 11-13, section Complications and frailty score paragraph 2 lines 1-2 and 9-11, section Colon versus rectal resection line 3 and 6; and Discussion paragraph 2 lines 4-6, paragraph 3 lines 7-8, paragraph 3 lines 4-5, paragraph 4 lines 1-4, paragraph 5 line 7, paragraph 6 lines 9-11, paragraph 7 line 5-8, and paragraph 8 has been reworded.

The style of Tables is somewhat confusing. Titles indicate that only colon resections were performed -colorectal resections would be more appropriate. The order OR, p-value, 95%CI is strange. In my view OR (95%CI), a p-value is more conventional.

Response- tables have been modified to reflect this observation.