7. CONCLUSIONS

With the monumental popularity and public acceptance of newer technology-based laparoscopic cholecystectomy within a short span of last 15 years, there is currently considerable interest on the systemic stress response secondary to the effects of laparoscopic and open surgery in order to better understand surgical pathophysiology so that the involved stress factors may, if feasible under clinical situations, be modulated for better quality of patient care and favourable surgical outcome. The stress response embraces hypophyseal, adrenocortical, and metabolic changes in addition to sympathoadrenal activity.

The present study measured and compared the classical metabolic (s-glucose), hormonal (s-cortisol, s-epinephrine and s-norepinephrine), immunological (Tumour necrosis factor alpha), acute-phase reactant (C-reactive protein) and haemodynamic (heart rate, systolic and diastolic arterial blood pressures, mean arterial pressure and rate-pressure product) responses during intra-operative and post-operative periods after laparoscopic cholecystectomy (LC), open cholecystectomy (OC) and open abdominal hysterectomy (OH) in a poor socio-economic subset of Indian population. The study was self-designed. It was carried out in a prospective controlled randomized manner after approval by the Board of Studies and the Committee of Advanced Scientific Research of the University which partly provided the funds for the ELISA-based laboratory measurements of the serum concentrations of the biomarkers. The peri-operative anaesthetic and pharmacological management were standardized to a set protocol in order to eliminate or at least minimize their bias in the study.

The present study recruited normal healthy adult patients (ASA Class I) and treated hypertensive patients without any other co-morbidity (ASA Class II), having mean age of 31, 33 and 45 years in the LC, OC and OH groups respectively.

The present study recorded marked intra-operative metabolic hormonal responses equally in all the three groups, which in the post-operative period not only normalized but also suggested presence of significant pre-operative mental stress; however, post-operative normalization after laparoscopic cholecystectomy was earlier than in the open groups.
Immune function with respect to TNF-alpha was found well preserved in laparoscopic surgery not only during the intra-operative period but also during the post-operative period as there was practically little or no expression of TNF-alpha during the operation and only mild insignificant expression on the 4th post-operative day. On the other hand, in both the open groups, immune function with respect to TNF-alpha was found well preserved only during the intra-operative period as in the laparoscopic group but there was significant post-operative enhancement of TNF-alpha expression, indicating delayed immune suppression. The inter-group difference between open cholecystectomy and open hysterectomy was insignificant throughout the peri-operative period, suggesting equal immunological responses between the two open groups.

With respect to acute-phase reactant response, C-reactive protein (CRP) in all the three groups showed gradually increasing enhancement of expression during the intra-operative period with further accentuation in the post-operative period (>3 fold increase in LC group and >6 fold increase in both open groups). Inter-group CRP difference between LC and OC groups was found insignificant at all time points throughout the peri-operative period, indicating similar acute-phase responses in the two techniques of cholecystectomy. The statistical intergroup CRP difference between LC and OH groups was found insignificant in the intra-operative period but significant in the post-operative period, suggesting delayed higher acute-phase response secondary to longer duration of time required for open hysterectomy with greater visceral tissue dissection. Inter-group CRP difference between OC and OH groups was found insignificant throughout the intra-operative period and on the 4th post-operative day, indicating almost similar acute-phase responses in the two open surgery groups.

With respect to haemodynamic response, all the three groups recorded significantly increased intra-operative changes in heart rate, arterial blood pressure and rate-pressure product all of which normalized in the post-operative period, with two noticeable differences—firstly, all haemodynamic parameters showed much more accentuation soon after start of the laparoscopic surgery as compared to the open surgery, and secondly, open hysterectomy group experienced mild bradycardia instead of tachycardia in the initial part of the intra-operative period though statistically insignificant. Treated hypertensive patients showed much more haemodynamic changes as compared to normotensive patients in all the three groups.
In nutshell, the present work does verify the rapidly evolving current evidence that the laparoscopic cholecystectomy is as stressful as the open surgery intraoperatively in terms of metabolic, hormonal and haemodynamic responses due to the mechanical effects of high pressure pneumoperitoneum although associated with earlier postoperative normalization and should be taken as seriously as any major surgery not only in hypertensive patients but also in normotensive patients. Furthermore, laparoscopic cholecystectomy patients experienced significant peri-operative immune preservation (Minimal TNF-alpha alterations in intra-and post-operative periods as compared to the open surgery groups) and much less acute-phase reactant expression (50 % CRP expression less than in open surgery groups). That means, earlier metabolic hormonal response normalization, lesser acute-phase reactant expression and significant peri-operative immune preservation following laparoscopic cholecystectomy are possible major determinant factors that usually lead to the commonly observed distinct clinical efficacy of laparoscopic cholecystectomy as also evident in the present study.