ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 7 | July - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY OF RENAL FUNCTION CHANGES IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY

General Surgery

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ABSTRACT

Minimally invasive surgery has rapidly evolved as a major speciality since laparoscopic cholecystectomy was first performed in March, 1985 by Prof. Muhe, in Germany[1]. Although it offered many advantages over laparotomy, new concerns arose regarding the effects of a pneumo-peritoneum onvarious organ systems. Renal venous pressure, hydrostatic pressure and glomerular filtration rate was adversely affected by pneumo-peritoneum. However, expansion of the extracellular volume can be beneficial to renal function[2,3,4]. This study is a cross-sectional prospective study, conducted in a series of 60 cases of chronic calculus cholecystitis admitted at Rajendra Institute of Medical Sciences, Ranchi.
Aim of the study : To observe preoperative and post operative renal functional status in patients undergoing laparoscopic cholecystectomy and evaluate the usual time required for return of deranged renal function , if any, to normal levels.
It was observed that the amount of urine output was distinctly less in LC during pneumo-peritoneum. However diuresis commenced soon after deflation of pneumo-peritoneum and normal urine output was resumed within 2 hours of postoperative period. These observations can also be appreciated in a study carried out byAnna –Maria koivusalo et al which showed decrease in urine output during pneumoperitoneum and diuresis started about 60 minutes after deflation[5].

KEYWORDS

INTRODUCTION :

Laparoscopic cholecystectomy has now replaced open cholecyst ectomy as the first choice of treatment for gallstone and inflammation of the gallbladder unless there are contraindications to the laparoscopic approach.

Following the advent of laparoscopic surgery, with its accompanying smaller incision, less pain and shorter hospitalization surgeon have performed increasing number of laparoscopic cholecystectomy[6]. Although laparoscopic cholecystectomy offered many advantages over laparotomy, new concerns arose regarding the effects of a pneumo-peritoneum on the cardiovascular and respiratory system[5]. The procedure of laparoscopic cholecystectomy operation involves artificial pneumo-peritoneum with carbon dioxide insufflations to minimize visceral injury during trocar insertion, creation of space for easier manipulation of instrument and to avail facilities of diathermy.The inert nature of carbon dioxide gas facilitates all of the above, but brings forth certain patho-physiological changes related to raised intra abdominal pressure due to pneumo-peritoneum. Exaggeration of these effects is also related to change of posture frequently practiced in laparoscopic operation. These involve almost all the organ systems.

Renal venous pressure, hydrostatic pressure and glomerular filtration rate was adversely affected by pneumo-peritoneum. However, expansion of the extracellular volume can be beneficial to renal function[2,3,4].To allow adequate exposure of the operative field, laparoscopic procedures require the creation of a pneumoperitoneum by insufflation of CO2. This has two corollaries: absorption of CO2 by the peritoneum and increased abdominal pressure usually monitored and limited to 12–14 mmHg. The induced high intra-abdominal pressure (IAP) and its consequences in modifications of organ perfusion and stimulation of major hormonal systems are associated with functional alteration of various organs[7]. In a study by T.Junghens et al,there was however no correlation ($p < 0.6$) found between systemic hemodynamic parameters (cardiac output, central venous pressure, and systemic vascular resistance) and hepatic and renal blood flow[7].

Aim of the study: To observe preoperative and post operative renal functional status in patients undergoing laparoscopic cholecystectomy and to evaluate the usual time required for return of deranged renal function , if any, to normal levels.

Materials and methods: This is a cross-sectional prospective study, conducted in a series of 60 cases of chronic calculus cholecystitis. Patients were selected from Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi. The duration of study -January 2017 to December 2018. A detailed clinical history was taken from every patient to ascertain the diagnosis of chronic calculus cholecystitis.

Thorough clinical examination was done – general survey, local and systemic examination to confirm chronic calculus cholecystitis and to exclude other possibilities. After clinically confirming the case, investigations were carried out (imaging and blood tests). Ultrasonography of whole abdomen was done to confirm the diagnosis. It demonstrated presence of calculi in the gall bladder, size of gall bladder, peri-cholecystic inflammation, thickness of the wall, width of the common bile duct and if any stone /sludge was present in it. Routine blood tests were conducted (Haemoglobin percentage, total count and differential count of WBC, ESR and Blood sugar).

Renal function tests (routine urine examination, blood urea and serum creatinine) were done in all patients to exclude any renal compromise.

X- Ray chest and ECG were also done as part of routine investigation.
Patients selected for the study were those who were

a) Symptomatic
b) With no h/o jaundice
c) No h/o any urinary trouble
d) USG showed gallstone with normal CBD diameter and absence of calculi in CBD.

Renal function test reports were within normal range. i.e.
***R**outine urine examination within normal range*
***S**erum urea: – 15 – 45 mg/ d*l
***C**reatinine: - < 1.5 mg/dl*

Every patient was catheterized under strict asepsis just before the starting of operation. Operations were conducted under general anaesthesia. Throughout the operation time we tried to maintain uniform rate and type of fluid infused to the patient as far as possible.

All laparoscopic cholecystectomies (LC) were done with four ports and keeping intra- abdominal pressure between 10 – 12 mm/Hg. Drain was placed routinely in sub-hepatic space. Blood for urea and creatinine were sent for assay on 2nd and 7th postoperative day in all patients. These values were compared to the preoperative values. Urine output was measured half hourly during operation and also after operation till it normalized.

Patients were followed up at regular intervals and were queried about

persistence of preoperative symptoms or appearance of new sign & symptoms and were managed accordingly.

The values of various results were observed and evaluated using simple statistical tools like mean, mode, median, standard deviation etc. The variations in the values of any parameter were observed in the pattern of their change and time taken by them to normalize.

Observartion and results:

1. In our study we observed that chronic calculus cholecystitis was more common in female. Female male ratio was found to be 4:1.

1. Analysis of Data Showing Blood Urea Levels at Different Intervals

Sex	No. of patients	%
Female	48	80
Male	12	20

Table 2

2.Analysis of Data Showing Serum Creatinine Levels at Different Intervals

	Preop. Level (within normal range)	Second Postop. Day		Seventh Postop. Day (within normal range)
		No Change	Change (Increase)	
No. of Patients	60 (100%)	58 (96.66%)	02 (3.33%)	60 (100%)
Mean Urea Levels (mg/dl)	30.4±7.53	34.86.47±7.77		30.06±7.66

In our study we observed that blood urea was increased in 3.33% of patients as compared to preoperative value and normalized in all patients around seventh post-operative day.

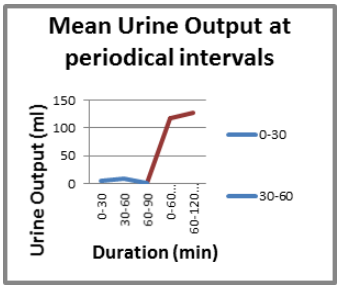
Table 11

	Preop. Level (within normal range)	Second Postop. Day		Seventh Postop. Day (within normal range)
		No Change	Change (Increase)	
No. of Patients	60 (100%)	60 (100%)	00	60 (100%)
Mean Creat. Levels (mg/dl)	0.89±0.24	0.98±0.23	0.82±0.20	

In our study we observed that serum creatinine did not change beyond the normal range in any patient.

Analysis of Data Showing Mean Urine Output (ml.) At Periodic Intervals

	During Operation			After deflation	
	0–30 min.	30–60 min.	60–90 min.	0–60 min.	60–120 min.
Mean Urine output (ml)	5.73± 3.95	8.86± 4.29	0.83± 2.93	116.83± 23.16	127.83± 24.82



In our study we observed that urine output decreased intra-operatively and was eventually normal around two hours post-operatively.There is a paradoxical decrease in mean urine output around 60-90 minutes, as only few patients had duration of surgery more than 50 minutes.

Discussion and Conclusion:

To assess renal function, blood urea, serum creatinine levels and urine output were measured.Increase of serum urea was in about 3.33% of patients while serum creatinine remained unaffected by the procedure.[Table 10,11 Graph 8]. Almost similar results were extrapolated by Gautham G. et. al. where there was a raised blood urea in peri-operative period[44].

Amount of urine output was distinctly less in LC during pneumo-peritoneum. However diuresis commenced soon after deflation of pneumo-peritoneum and normal urine output was resumed within 2 hours of postoperative period. [Table 12, Graph 9]. These observations can also be appreciatedin a study carried out byAnna –Maria koivusalo et al which showed decrease in urine output during pneumoperitoneum and diuresis started about 60 minutes after deflation[21].

To conclude, regarding renal function tests, there was no significant change in serum creatinine level. There was elevation of blood urea in very few patients (3.3%).They also normalized within seven postoperative days. The only exceptional finding was reduction of urine output during pneumo-peritoneum in laparoscopic cholecystectomy followed by diuresis post deflation.

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