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Research Article

Prevalence of nonspecific ST-T wave changes and its correlation among patients underwent surgeries for acute abdomen.

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ABSTRACT: Background & Aims: The prevalence of isolated minor nonspecific ST-segment and T-wave abnormalities (NSSTTAs) in patients undergoing surgeries for acute abdomen are poorly understood. Minor NSSTTAs are common in asymptomatic patients and often occur in the absence of other ECG abnormalities. Thus, we study the prevalence of NSSTTAs in patients undergoing surgeries for acute abdomen.

Material and Method: This retrospective study was conducted at our hospital. Data of all 120 patients such as demographic data (age, gender), their smoking habit, clinical conditions causing acute abdomen, hypercholesteremia, ECG changes were collected from record. Through this information, prevalence of NSSTTAs among patients undergoing surgeries for acute abdomen were checked and their correlation with demographic data, smoking habit, hypercholesteremia and their cause of acute abdomen were checked.

Results: Out of 120 patients, 16 patients were having history of IHD and 5 patients having history of chest pain along with ECG changes so these 21 patients were excluded from the study. As these ECG changes were probably due to cardiac cause. So, data of remaining 99 patients were studied. Among these patients, 40 patients' ECG showing NSSTTAs. Demographically out of these 40 patients, 30 were above 40 years of age and 10 were below 40 years of age, 28 were male and 12 were female. Among these patients who showing non-specific ECG changes, 32 were smoker and 12 patients serum lipid profile showed hypercholesteremia. Among these, 22 patients were operated for acute cholecystitis, 10 were for acute appendicitis, 4 were for intestinal obstruction, 2 were for pyelolithotomy, 2 were for peptic perforation.

Conclusion: The prevalence of NSSTTAs among patients coming for general abdominal surgeries was almost 40.4%. These changes were more seen in eldery individual and smoker. Also clinical conditions like cholecystitis, appendicitis were produces nonspecific ECG changes. Sometime NSSTTAs were due to physiological response other than any cardiac events.

INTRODUCTION

As ECG is a very inexpensive diagnostic technique available even in basic health care facilities, and its application and analysis is easy for health care professionals, it can be made use of to detect early changes in patients undergoing surgeries for acute abdomen to evaluate possible risk of cardiovascular morbidity. Minor nonspecific ST- segment and T-wave abnormalities are common in asymptomatic patients and often occur in the absence of other ECG abnormalities.[1-4] Isolated minor NSSTTAs generally represent very minor or upsloping ST- segment depression and flat or minimally inverted T waves. Magnitude of increase risk for these changes is due to old age, smoking habit, Hypercholesteremia etc. Nicotine, which is the main component of tobacco, may be the causative agent. NSSTTAs due to nicotine are attributed to the release of catecholamines[5], which are released due to the binding of nicotine to the nicotinic cholinergic gate on the cation channels in receptors throughout the body[6].

The certain proporation of patients with ECG changes actually didn't have coronary artery disease or other acute cardiac condition and therefore require treatment of the underline illness only without spending the time for cardiac investigation or special treatment. Some kind of treatment may be even harmful for the patients with abdominal illness such as thrombolytic, anticoagulant, aggressive antiaggregant therapy. In medical literature the investigators found some case reports and works about the ECG changes in acute biliary disease in patients without cardiac disease but actually incidence of ECG changes that suggest but not represent an acute coronary illness isn't knowing. Therefore this is necessary to investigate actually incidence of ECG changes that mimic acute coronary syndrome in acute cholecystitis, acute biliary disease, pancreatitis and determined clinical and laboratory characteristics that helps to differentiate this patients.

Material and Method

The retrospective study was conducted at our institute. Data were collected from 1st January, 2016 to 30th June, 2016. We studied record of 120 patients within 18-70years undergoing

surgeries for acute abdomen. We exclude the patients coming for elective surgery, Having h/o IHD, h/o chest pain, gambharaman or having chronic ECG changes known by medical history or sepsis. Digitally recorded twelve lead ECGs at rest using standardized procedures at the baseline examination were obtained from record. ECGs were analysed electronically, with manual over reading by trained physicians to ensure quality control. ECGs were classified by Minnesota code. Demographic data (age, gender), their smoking habit, clinical condition causing acute abdomen, hypercholesteremia, ECG changes, their lab investigation including CPK-MB, Troponin, 2D-echo finding were collected from record. Through this information prevalence of NSSTTAs among patients coming for general abdominal surgeries were checked and their correlation with demographic data, smoking habit, hypercholesteremia and their cause of acute abdomen were looked. MedCalc version 12.2.1.0 software (Ostend, Belgium) was used for statistical calculations. The data was collected and tabulation formed and statistical analysis of continuous data was done by unpaired "t" test and Chi-square test was applied for discrete data. Results were considered statistically significant with p value <0.05 and highly significant with p value <0.001.

Observation and Results

Out of 120 patients, 16 patients were having history of IHD and 5 patients having history of chest pain along with ECG changes so these 21 patients were excluded from the study. As these ECG changes were probably due to cardiac cause. So, data of remaining 99 patients were studied. 67(67.7%) were male and 32(32.3%) were female, 74(74.7%) were above 40 years of age and 25(25.2%) were below the age of 40 years. Among these, 78(78.7%) were smokers.

From 99 patients, 40(40.4%) patients' ECG showing NSSTTAs. Demographical data of 40 patients were as per Table: 1. among the patients who showing non-specific ECG changes, 32 were smoker and 12 patients serum lipid profile shows hypercholesteremia. In these 40 patients which were coming for operative procedure with ECG changes, 22 patients were operated for acute cholecystitis, 10 were for acute appendicitis, 4 were for intestinal obstruction,2 were pyelolithotomy, 2 were peptic perforation.

Table: 1 Distribution of different variables studied in Patients with NSSTTAs.

Studied variables	From all patients with NSSTTAs
Sex M:F	28:12 (70%:30%)
Age > 40 years:<40years	30: 10(75%:25%)
Smoker: Non smoker	32: 8(80%:20%)

Table: 2 Clinical conditions for which patients showing nonspecific ECG changes operated for

Clinical condition	No. Of patients (%)
Acute cholecystitis	22(55%)
Acute appendicitis	10(25%)
Intestinal obstruction	4(10%)
Pyelolithotomy	2(5%)
Peptic perforation	2(5%)

Table: 3 Different variety of Nonspecific ST- T changes

NSSTTAs	No. Of patients (%)
ST junction derpression<0.5mm	20(50%)
ST junction depression over 1mm and ST segment ascending(upsloping)	6(15%)
T-wave flat, diphasic or inverted less than 1mm	12(30%)
T- wave amplitude positive and T- to R- wave amplitude ratio of less than 1:20	2(5%)

Discussion

The few works that address the surgical patient with NSSTTAs are conflicting in their results, and their cause is generally of cardiac origin. But some studies shows that their origin is noncardiac, also sometime these changes were due to transient physiological response, such as ingestion of food, change in posture, or emotional distress.

The study group was composed of patients within 18-70years underwent surgeries for acute abdomen. ST-segment and T-wave abnormality in ECG were labeled nonspecific when minor or upsloping of ST-segment depression and flat or minimally inverted T-wave in asymptomatic patients and no other ECG abnormalities. Occurrence of T wave abnormalities was different in recordings. But on the whole, it was observed with greater frequency in smokers than in nonsmokers. Baden L et al[7],Dilaveris P et al[8],Chatterjee S et al[9].and Khan IS et al[10] found that R, S and T wave amplitudes were decreased at higher rates in smokers than non-smokers. The mechanism for the decrease in R, S and T wave amplitude is unknown. It might be that smoking has a direct effect on ventricular electrical activity, also smoking causes acceleration of atherosclerosis, which in turn leads to non-specific R, S and T wave changes[7]. Though at the current stage, it is not possible to explain all the ECG changes caused by smoking, it has been proposed that Nicotine, which is the main component of tobacco, causes release of catecholamines[5]. This occurs due to the binding of nicotine to the nicotinic cholinergic gate on the cation channels in receptors throughout the body.

Isolated NSSTTAs were increasingly shown in asymptomatic elderly individual. Anita k et al[11] also shown similar results. Increase Isolated NSSTTA in asymptomatic elderly individual have been ascribed to transient physiologic phenomena, such as ingestion of food, change in posture, or emotional distress.[12,13] This may be due to hyperventilation, central nervous system lesions, electrolyte disturbances, use of drugs (i.e. digitalis, antiarrhythmic and psychotrophic drugs), or athletic ability.[12,14-16]Many conditions can temporarily alter an electrocardiogram. Inflammation of the hepatobiliary system and pancreas has been noted to produce changes in electrocardiograms.[17] Acute inflammatory and ulcerative conditions involving the gallbladder or duodenum cause irritation and spasticity of surrounding structures. This can create reflex stimuli through autonomic pathways to restrict or alter the coronary blood supply, maybe such that existing minor deficiencies in the coronary circulation become manifest.[18] Gallbladder distension has been shown to increase heart rate, arterial blood pressure[19, 20] and plasma rennin levels[21] It is possible that acute upper abdominal disease can

prematurely reveal subclinical changes in the coronary circulation. The alterations in the ECG could have been caused by temporary myocardial ischemia, since the changes disappeared after the condition treated. However, the exact pathophysiological mechanism underlying the ECG changes remain unclear. A diseased gallbladder has been associated with changes in the ECG similar to those of ischemic heart disease since 1878.[22–24] this prompted studies[25, 26] examining the ECG effects of biliary distortion. In these studies, the ECG changes were usually diffuse, nonspecific, T-wave inversions or ST segment depressions.

Conclusion

The prevalence of NSSTTAs among patients undergoing surgeries for acute abdomen was almost 40.4%. These changes were more seen in eldery individual and smoker. Also clinical conditions like cholecystitis were produces nonspecific ST-segment and T-wave changes.

References

1. Kumar A, Lloyd-Jones DM. Clinical significance of minor nonspecific ST-segment and T-wave abnormalities in asymptomatic subjects. Cardiology in Review 2007; 15: 133–142. [PubMed: 17438379]

2. Daviglus ML, Liao Y, Greenland P, Dyer AR, Liu K, Xie X, Huang CF, Prineas RJ, Stamler J. Association of nonspecific minor ST-T abnormalities with cardiovascular mortality. JAMA 1999;281: 530–536. [PubMed:

3. Greenland P, Xie X, Liu K, Colangelo L, Liao Y, Daviglus ML, Agulnek AN, Stamler J. Impact of minor electrocardiographic ST-segment and/or T-wave abnormalities on cardiovascular mortality during long-term follow-up. Am J Cardiol 2003;91:1068–1074. [PubMed: 12714148]

4. Prineas RJ, Grandits G, Rautaharju PM, Cohen JD, Zhang ZM, Crow RS. Long-term prognostic significance of isolated minor electrocardiographic T-wave abnormalities in middle-aged men free of clinical cardiovascular disease. Am J Cardiol 2002; 90:1391–1395. [PubMed: 12480053]

5. Stewart PM, Cetterall JR. Chronic nicotine ingestion and atrial fibrillation. Br.Heart J. 1985;54: 222–23.

6. Yashima M, Ohara T, Cao JM, Kim YH, Fishbein MC, Mandel WJ, et al. Nicotine increases ventricular vulnerability to fibrillation in hearts with healed myocardial infarction. Am.J Physiol Heart Circ Physiol. 2000 Jun;278(6):H2124.

7. Baden L , Weiss ST , Thomas HE Jr , Sparrow D. Smoking status and the electrocardiogram: a cross-sectional and longitudinal study. Arch Environ Health. 1982 Nov-Dec; 37(6):365-9.

8. Dilaveris P, Pantazis A, Gialafos E, Triposkiadis F, Gialafos J. The effects of cigarette smoking on the heterogeneity of ventricular repolarization. AM Heart J. 2001 Nov; 142(5):833-7.

9. Chatterjee S, Kumar S, Dey SK, Chatterjee P.Chronic effect of smoking on the electrocardiogram. Jpn Heart J.1989 Nov; 30(6):827-39.

10. Khan IS, Rahman MA, and Amin R. Study of ECG Changes in Apparently Healthy Adult Male Smokers. Dinajpur Med Col J 2011 Jan; 4(1):7-14.

12. Kemp GL, Ellestad MH. The significance of hyperventilative and orthostatic T-wave changes on the

electrocardiogram. Arch Intern Med 1968;121: 518–523. [PubMed: 5652402]

13. Schang SJ Jr, Pepine CJ. Transient asymptomatic S-T segment depression during daily activity. Am

J Cardiol 1977;39:396–402. [PubMed: 402803]

14. Ostrander LD Jr. The relation of "silent" T wave inversion to cardiovascular disease in an epidemiologic study. Am J Cardiol 1970;25:325–328. [PubMed: 5443911]

15. Guazzi M, Fiorentini C, Polese A, Magrini F, Olivari MT. Stress-induced and sympathetically mediated

electrocardiographic and circulatory variations in the primary hyperkinetic heart syndrome. Cardiovasc Res 1975;9:342–354. [PubMed: 1175181]

16. Taggart, P.; Carruthers, M.; Somerville, W. Emotions, catecholamines, and the electrocardiogram.

In: Yu, PN.; Goodwin, JF., editors. Progress in Cardiology. Philadelphia, PA: Lea & Febiger; 1978.p. 103.

17. Dickerman JL. Electrocardiographic changes in cardiac patients with acute gallbladder disease. *Am Surg.* 1986; 52: 541–543.

18. Clarice NE. Electrocardiograph changes in active duodenal and gall bladder disease. *Am Heart J.* 1945;29:628–632.

19. Brettwlesser ER. Electrocardlographic observation in chronic cholecystitis before and after surgery. *Am J Med Sci.* 1947;213:598–602.

20. Fitz-Hugh T, Wolferth CC. Cardiac improvement following gallbladder surgery: electrocardiographic evidence in cases with associated myocardial disease. *Ann Surg.* 1935; 101: 478–483.

21. Vacca G, Battaglia A, Grossini E, Papillo B. Tachycardia and presser responses to dlstention of the gallbladder In the anesthetized pig. *Med Sci Res.* 1994; 22: 697– 699.

22. Breyfogle HS. The frequency of coexisting gallbladder and coronary artery disease. *JAMA.* 1940;114:1434–437.

23. Walsh BJ, Bland EF, Taquini AC, White PD. The association of gall bladder disease and of peptic ulcer with coronary disease: a post-mortem study. *Am Heart J.* 1941;21:689–697.

24. Babcock RH. Chronic cholecystitis as a cause of myocardial incompetence. *JAMA.* 1909;52:1904 –1911.

25. Swartz M, Herman A. The association of cholecystitis with cardiac affections: a study based on 109 cases. *Ann Intern Med.*1930;4:783–794.

26. Hodge GB, Messer AL. The electrocardiogram in biliary tract disease and during experimental biliary distention. *Surg Gynecol Obstet.* 1948;86: 617– 628.

27. Kannel WB, Anderson K, McGee DL, Degatano LS, Stampfer MJ. Nonspecific electrocardiographic

abnormality as a predictor of coronary heart disease. Am Heart J 1987;113:370–376. [PubMed:3812192]

28. Relationship of blood pressure, serum cholesterol, smoking habit, relative weight and ECG abnormalities to incidence of major coronary events: final report of the Pooling Project. J Chronic Dis 1978;31:201–306. [PubMed: 681498]

29. De Bacquer D, De Backer G. Electrocardiographic findings and global coronary risk assessment. Eur Heart J 2002;23:268–270. [PubMed: 11812060]

30. Larsen CT, Dahlin J, Blackburn H, Scharling H, Appleyard M, Sigurd B, Schnohr P. Prevalence and prognosis of electrocardiographic left ventricular hypertrophy, ST segment depression and negative T-wave. Eur Heart J 2002;23:315–324. [PubMed: 11812068]

31. Wilson PWF, D'Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. Circulation 1998;97:1837–1847. [PubMed:9603539]

32. Gottdiener JS, Arnold AM, Aurigemma GP, Polak JF, Tracy RP, Kitzman DW, Gardin JM, Rutledge JE, Boineau RC. Predictors of congestive heart failure in the elderly. J Am Coll Cardiol 2000;35:1628–1637. [PubMed: 10807470]

33. Rajala S, Kaltiala K, Haavisto M, Mattila K. Prevalence of ECG findings in very old people. Eur Heart J 1984;5:168–174. [PubMed: 6723687]

34. Tervahauta M, Pekkanen J, Punsar S, Nissinen A. Resting electrocardiographic abnormalities as predictors of coronary events and total mortality among elderly men. Am J Med 1996;100: 641–64.