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RESEARCH ARTICLE

DIAGNOSIS OF ACUTE APPENDICITIS BY RIPASA SCORING SYSTEM AS AN OBSERVATIONAL STUDY

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Abstract

Introduction: Acute appendicitis is one of the most common cause of surgical emergency.Acute appendicitis can progress to perforation, which has high mortality and morbidity. Hence surgeons are inclined to operate rather than waiting when the diagnosis is probable[1]. When presenting in a teenager and with a classical history, presents the Surgeon with little by way of a diagnostic challenge.

Method: It was a prospective observational study of "Clinical evaluation of RIPASA scoring system in the diagnosis of acute appendicitis" was carried out in the department of general surgery, Acharya Vinoba Bhave Rural Hospital, affiliated to Jawaharlal Nehru Medical College, Sawangi, Wardha, from April 2012 to September 2014. Total 80 patient was included in this study.

Result: The most common position of appendix as found in our study was retro-caecal and the least common position was pre-ileal.We found that in our study sensitivity was 96%, specificity was 65%, positive predictive value was 67%, negative predictive value was 86% and diagnostic accuracy was 70%. The cut-off value, we have taken is 7.5. As compared to the study done by Chong CF et al[18] in2011, our sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were 2% less, 16.3% less, 18.3% less, 11.4% less and 21.8% less respectively [Table 5].ROC plots for the RIPASA scoring system. The optimal cut-offthreshold score is 7.5, with a sensitivity and specificity of 0.96 and 0.65 (1-specificity= 0.35) respectively. The positive predictive value and negative predictivevalue are 0.67 and 0.86respectively.The diagnostic accuracy of the study being 70%.So according to the above table we are taking:True positive = 44, True negative = 22, Hence,True positive + true negative divided by total number of patients44 + 22 = 66 / 80 = 70% is the diagnostic accuracy.

Conclusion: The RIPASA score is simple scoring system with high sensitivity and specificity for the diagnosis of acute appendicitis .RIPASA score is currently a better diagnostic scoring system for diagnosis of acute appendicitis compared to OTHER particularly in

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Indian population. Making a correct and prompt diagnosis of acute appendicitis including its possible pathological stage is possible with the RIPASA score, which is easily obtained using simple clinical and laboratory data, without a need of unwanted admissions and expensive imaging studies like CT scan.

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Introduction:-

Acute appendicitis is one of the most common cause of surgical emergency.Acute appendicitis can progress to perforation, which has high mortality andmorbidity. Hence surgeons are inclined to operate rather than waiting when thediagnosis is probable[1]. When presenting in a teenager and with a classical history, presents the Surgeon with little by way of a diagnostic challenge. However this disease has ability to simulate other conditions and can also frequently be imitated by other pathologies[2]. Despite more than 100 years of experience, accurate diagnosis still evades the surgeon. Owing to its myriad presentations; it is a common but difficult diagnostic problem. Many efforts are being taken towards early diagnosis and intervention as approximately 6% of population suffer from this disease during their lifetime[3].The accuracy of clinical examination has been reported in the range of 71%to 97%[4].Attempts to increase the diagnostic accuracy of acute appendicitis have included computer aided diagnosis, imaging by USG, laparoscopy and even radioactive isotope imaging[5,6,7,8]. Appendicitis is most frequently found in 2nd to 4th decades of life with the mean age being 31.3 and median age being 22years. There is a slight male is to female predominance. (M: F 1.2- 1.3: 1) [9].Diagnostic difficulty in patients with atypical clinical findings has resulted in unesscessary appendectomies, which have been variably reported in surgery literature between 8% and 33% with an average of about 20%. In fact the rate of negative appendectomies increases to 35% - 45% in young women of childbearing age inwhom differential diagnosis from pelvic inflammatory may be extremely difficult.Equally distressing is the fact that perforation may occur in up to 35% of cases[10].Appendicitis can occur due to various causes like difference in dietary habits,food adulterations, indulging in mixed diet habits, seasonal changes particularlycolder periods. Etiology of appendicitis are plenty among which obstruction to the lumen and infection play an important role. Of all infections, E.coli is the most common organism to cause appendicitis.The classical signs and symptoms of acute appendicitis was first reported by Reginald Fitz[11] in 1886. Apart from classical presentation, acute appendicitis presents with unusual features or associated with unusual conditions.The emergency surgeon must also remember that "one can‟t step twice in to the same river" and that the patient with right iliac fossa pain, and a scar into abargain, is not the same patient psychologically or physically as before. Finally, there is the economic argument that, unescessary appendectomy is a waste of scarce resources.Lawson Tait was 1st surgeon to do deliberate appendectomy (1567). Claudius Amyand operated on an 11 year boy with a long standing scrotal hernia withperforated appendix in it. (1686)Rate of negative appendectomy has remained constant at 10 per 10,000 patients per year. The percentage of misdiagnosis of appendicitis is significantly higher among women than men. (22.9 – 9.3%). The negative appendectomy rate for women of reproductive age group is 23.2% with the highest rate identified in women aged 40 – 49 years. The highest negative appendectomy rate noted for women more than 80 years of age[12,13,14].The operation of negative appendix is accompanied by the usual spectrum of immediate postoperative complications in up to 15% of patients (Lewis et al 1975)[15].Some patients may have complications such as intestinal obstruction and incisional hernia. The operative techniques used for appendectomy have never become completely standardised, it varies from case to case.There are various scoring systems to aid the diagnosis of acute Appendicitis[16,17]. One of them is RIPASA (Raja Isteri Pengiran Anak Saleha Appendicitis) scoring system which has been developed particularly applicable to south east-asian region. The Raja Isteri Pengiran AlakSaleha (RIPASA) hospital is the national hospital of Brunei, Darussalem[18,19]. This system has been shown to have significantly higher sensitivity, specificity and diagnostic accuracy than that reported for ALVARADO and MODIFIED ALVARADO scoring system. The Alvarado and modified Alvarado scores have been developed to aid diagnosis, but both scoring systems have poor sensitivity and specificity when applied in Middle Eastern and Asian populations[20,21].Not many studies have been done to assess the diagnostic accuracy of this promising scoring system when applied to populations in Indian subcontinent. He published his article by 2011 and its 3 years no study has been conducted[18].As far as our knowledge is concerned this study is the first one in India.Hence we in our institution wanted to assess the sensitivity, specificity and diagnostic accuracy of RIPASA scoring system.

Material And Methods:-

It was a prospective observational study of "Clinical evaluation of RIPASA scoring system inthe diagnosis of acute appendicitis" was carried out in the department of generalsurgery, Acharya VinobaBhave Rural Hospital, affiliated to Jawaharlal NehruMedical College, Sawangi, Wardha, from April 2012 to September 2014. Total 80 patient was included in this study. All thepatients with right iliac fossa pain attending surgery department were subjected toclinical assessment by applying RIPASA scoring system and various clinical tests inconsultation with senior surgeon for diagnosis of acute appendicitis and admitted tosurgery ward. After admission toward the patients were examined according to RIAPASA SCORING SYSTEM which included:Gender,Symptoms LIKE :Right iliac fossa pain**,** Migration of right lower quadrant pain**,** Anorexia**,** Nausea and vomiting**,** Duration of symptoms (<48hrs or >48hrs) and Signslike : Right iliac fossa tenderness**,** Right iliac fossa guarding**,** Rebound tenderness**,** Rovsing"s sign**,** Fever Laboratory tests:Raised white blood cells, Negative urine analysis**.** All patients were subjected to ultrasound examination to exclude any other associated pathology and also confirm the diagnosisin doubtful cases.Surgery in required cases was done under general anaesthesia or spinal anaesthesia. Abdomen was opened by Mc Burney"s or right Para median incision. Atsurgery the position of the appendix was first identified before disturbing thestructures. Other intra-operative findings included length of the appendix and mesoappendix. After completion of appendectomy the specimen was subjected to histopathological examination by the qualified pathologist. Only those cases whichwere proved as appendicitis histopathologically were included in the study.

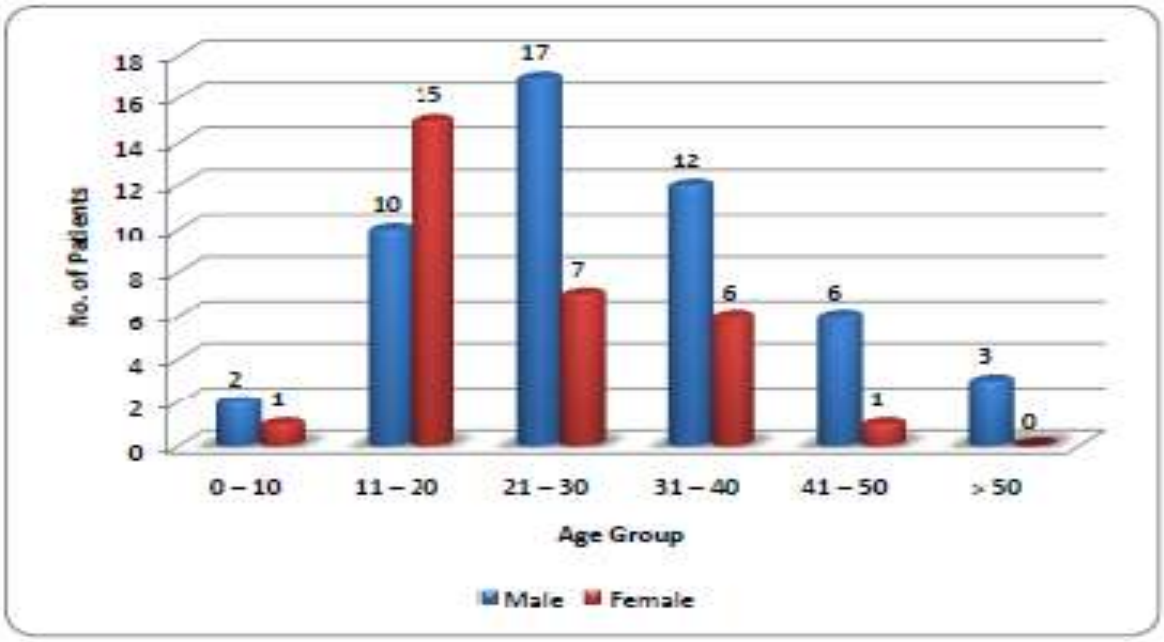
In Inclusion Criteria:

Patients of any age group and both sexes presenting to emergency department with pain in the right iliac fossa having clinical suspicion of acute appendicitis.

In Exclusion Criteria:

Patients having pain in the other quadrants of the abdomen.

Observation And Results:-



Graph No 1:- Shows age and sex distributions of patients with acuteappendicitis.

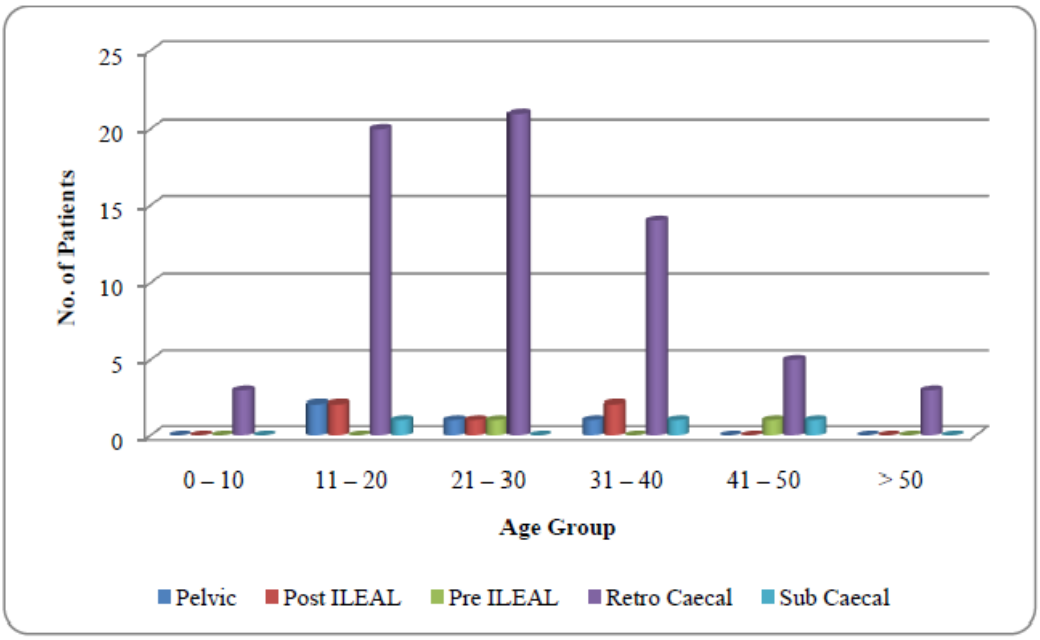
Out of 80 patients 50 (62.5%) were males and 30 (37.5%) were females withmale: female ratio (1.67:1).The maximum number of patients were in the age group of 11-20 years(31.3%) followed by 21-30 years (30%).The mean age of study population was 27.75 ± 11.80.**RIPASA scoring system has given points as follows:**Male = 1, Female = 0.5, Age < 39.9 years = 1, Age > 40 years = 0.5

Table No. 1:- Showing sex wise distribution of patients according to symptom under RIPASA scoring system.

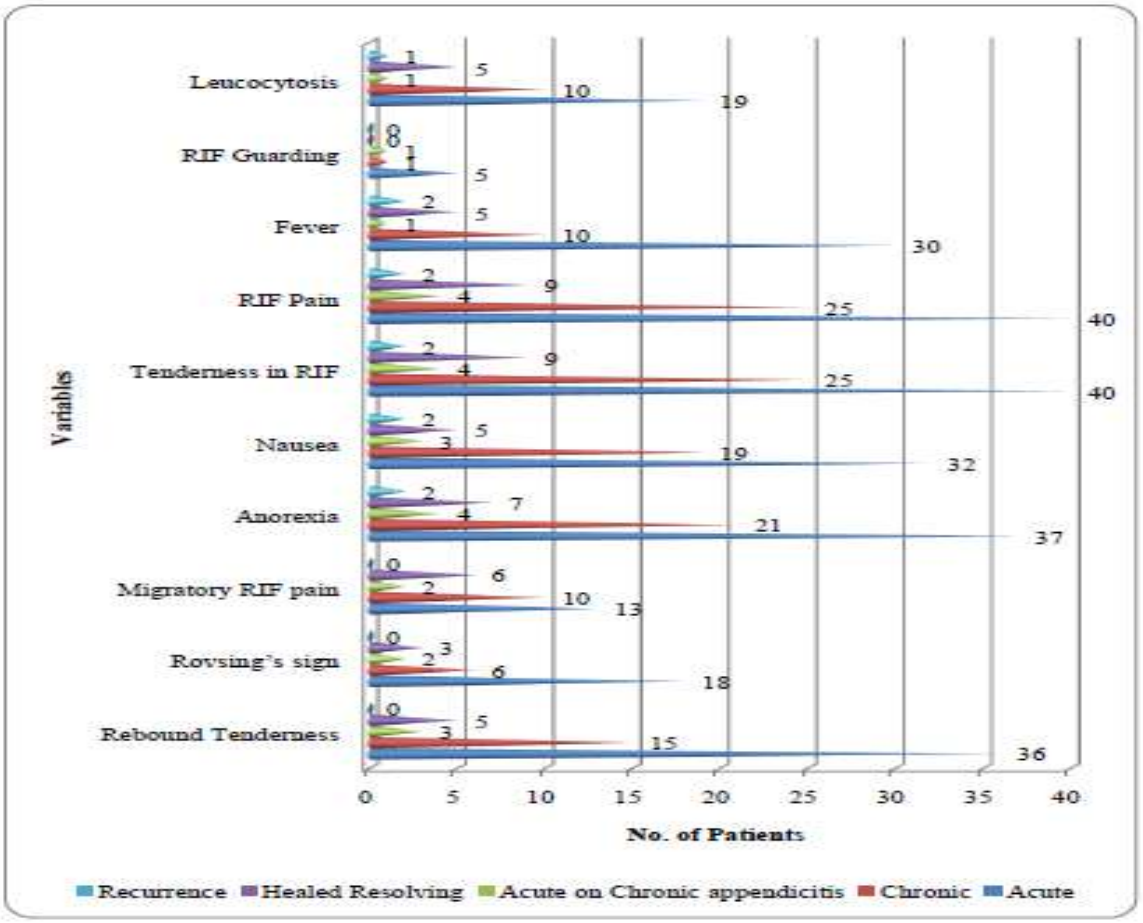
Gender	Total Pt.	Symptoms in RIPASA Score				
		Anorexia	Nausea/ Vomiting	Migratory RIF Pain	RIF Pain	Fever
Male	50 (62.5)	43	35	20	50	32
Female	30 (37.5)	28	26	11	30	16
Total	80 (100.0)	71	61	31	80	48

Table No. 2:- Showing sex wise distribution of patients under various clinical Signs.

Sex	Clinical Signs			
	Rebound Tenderness	Rovsing's Sign	Tenderness in RIF	RIF Guarding
Male	38	18	50	6
Female	21	11	30	1
Total	59	29	80	7



Graph No. 2:- Showing age wise distribution of patients according to intraoperative position of appendix



Graph No. 3:- Showing distribution of patients according to signs, symptomsand laboratory test under RIPASA score in relation to histopathology.

Table No. 3:- Showing distribution of patients under RIPASA scoring system inrelation to histopathology.

Score	Histopathology					Total
	Acute	Chronic	Acute on Chronic appendicitis	Healed/ Resolving	Recurrence	
≥ 7.5	39	15	3	7	2	66
< 7.5	1	10	1	2	0	14
Total	40	25	4	9	2	80

Chi Square = 15.719 p Value =0.003

Table No. 4:- Showing age wise distribution of patients under Leucocytosis.

Leucocytosis	No. of Patients	Percentage
≥ 11000	36	45.00%
< 11000	44	55.00%
Total	80	100.00%

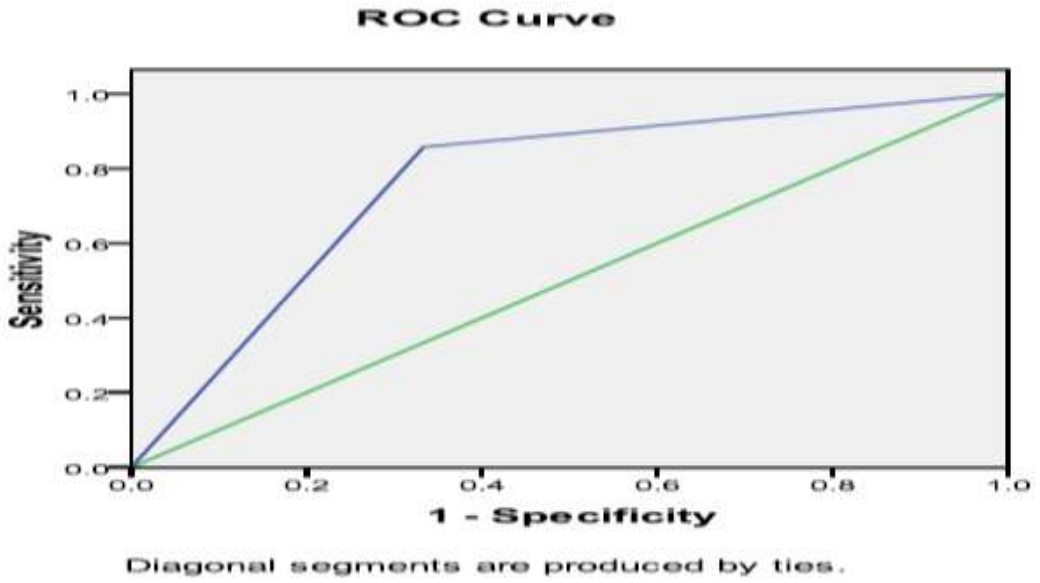
Table No. 5:- Showing distribution of patients under RIPASA scoring system inrelation to histopathology.

RIPASA Score	Histopathology		Total
	Acute	Non Acute	
< 7.5	2 (2.50)	12 (15.00)	14 (17.50)
≥ 7.5	44 (55.00)	22 (27.50)	66 (82.50)
Total	46 (57.50)	34 (42.50)	80 (100.00)

Chi Square = 10.913 p-Value = 0.001

Score of ≥ 7.5 was found to be significantly associated withacute appendicitis (p-value - < 0.05) with sensitivity of 96% and specificity of 65%.The additional parameter of foreign NRI as RIPASA had given 1point. However there is not a single NRI patient in our study.

Curve No 1: ROC Curve:



ROC plots for the RIPASA scoring system. The optimal cut-offthreshold score is 7.5, with a sensitivity and specificity of 0.96 and 0.65 (1-specificity= 0.35) respectively. The positive predictive value and negative predictivevalue are 0.67 and 0.86respectively.The diagnostic accuracy of the study being 70%.So according to the above table we are taking:True positive = 44, True negative = 22, Hence,True positive + true negative divided by total number of patients44 + 22 = 66 / 80 = 70% is the diagnostic accuracy.

Discussion:-

As per Chong CF et al[18] (2011) in south East Asian region RIPASA scoring system is useful in terms of diet and ethnic origin. It is simple and easy to use. The clinical judgement for appendectomy depends upon ROC, sensitivity, specificity, negative predictive value, positive predictive value and diagnostic accuracy. We have done this study in 80 patients at Acharya Vinoba Bhave Rural Hospital. Acute appendicitis was more common in the age group 11 – 20 years. The mean age of study population was 27.75 ±11.80.There is male is to female preponderance seen, males being 50 and females being 30 in number. Male is to female ratio being 1.67:1 [GRAPH 1].Symptom duration less than 48 hours was seen most frequently in the agegroup 21 – 30 years while symptom duration of more than 48 hours was seen mostfrequently in age group of 31 – 40 years [TABLE 1]. Symptom duration of < 48 hours was morefrequent amongst the males.Rovsing‟s sign as well as rebound tenderness were most commonly observedin the age group of 21 – 30 years [TABLE 2]. Tenderness in the right iliac fossa was the mostcommonly observed sign in all the age groups. Most common sign present in bothmales and females were right iliac fossa tenderness followed by rebound tenderness and rovsing‟s sign.The average length of the appendix was 7.85cm [GRAPH 2]. Mesoappendix was present throughout the length in all the patients. The most frequently observed symptom in our study was right iliac fossa painfollowed by anorexia and nausea/ vomiting.Right iliac fossa pain followed by anorexia were the most common symptoms observed in both males and females [GRAPH 3]. In histopathology acute appendicitis was most common finding [TABLE 3]. In our study 55% patient have leucocyte count less than 11000 [Table 4]. The most common position of appendix as foundin our study was retro-caecal and the least common position was pre-ileal.We found that in our study sensitivity was 96%, specificity was 65%, positive predictive value was 67%, negative predictive value was 86% and diagnostic accuracy was 70%. The cut-off value, we have taken is 7.5. As compared to the study done by Chong CF et al[18] in2011, our sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were 2% less, 16.3% less, 18.3% less, 11.4% less and 21.8% less respectively [Table 5].ROC plots for the RIPASA scoring system. The optimal cut-offthreshold score is 7.5, with a sensitivity and specificity of 0.96 and 0.65 (1-specificity= 0.35) respectively. The positive predictive value and negative predictivevalue are 0.67 and 0.86respectively.The diagnostic accuracy of the

study being 70%.So according to the above table we are taking:True positive = 44, True negative = 22, Hence,True positive + true negative divided by total number of patients44 + 22 = 66 / 80 = 70% is the diagnostic accuracy. [Cuarve 1]. So our results for RIPASA scoring system are not completely matching with Chong CF[18] study. In order to obtain a higher diagnostic accuracy for acute appendicitis, different scoring systems should be utilized as none of the scoring system alone is clearly superior to others.Further studies may be undertaken to assess the usefulness of applying multiple scoring systems in patients suspected of acute appendicitis.

Conclusion:-

The RIPASA score is simple scoring system with high sensitivity and specificity for the diagnosis of acute appendicitis .RIPASA score is currently a better diagnostic scoring system for diagnosis of acute appendicitis compared to OTHER particularly in Indian population. Making a correct and prompt diagnosis of acute appendicitis including its possible pathological stage is possible with the RIPASA score, which is easily obtained using simple clinical and laboratory data, without a need of unwanted admissions and expensive imaging studies like CT scan.

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