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Research Article

TO CORRELATE CRP LEVELS WITH CURB65 SCORE IN MORTALITY AND OUTCOME IN PATIENTS OF COMMUNITY ACQUIRED PNEUMONIA

Mir Nadeem*[1], Mir Waseem*[2], Tabinda Ayub shah*[2], and Saba Maqbool*[3]

[1] PG scholar Department of Medicine Gmc Srinagar and Associated Hospital
[2] PG Scholar Department of Medicine Skims Soura Srinagar
[3] Jr Skims Medical College

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A B S T R A C T

Background: Pneumonia is an infection of the pulmonary parenchyma. It can vary from inactive to eruptive in presentation and from mild to fatal in severity.Community-Acquired Pneumonia (CAP), is an important cause of morbidity and mortality worldwide.
Aims and objectives: To correlate C-reactive protein levels with curb 65 score in mortality and outcome of community acquired pneumonia .
Material and methods: the total of 60 patients were studied All the eligible patients with diagnosis of CAP who did no required hospitalisation were put on empirical antibiotic therapy and were followed on old basis. Patients admitted and The initial assessment included detailed history and clinical examination. Routine investigation at admission included complete blood count with ESR ,kidney function test ,liver function test,LDH, arterial blood gas analysis , chest roentgenogram, ECG, thoracocentesis with analysis of pleural fluid (ph, total cell count , differential cell count , LDH , amy-lase ,gram staining and culture). Gram staining and culture of respiratory secretions and blood
culture were performed where ever feasable /indicated . A semi quantitative test for CRP was performed at admission and repeated at day 4. The CRP kit used was manufactured by Randox laboratories ltd.with clinical assessment and initial lab investigations curb 65 score was calculated in all patients .
Result: Patients were examined for the signs which are directed in table 2.It was observed that CRP levels were significantly increased in 45% of patients. The raised cap levels in studied patients was associated with increased mortality and morbidity and crp was repeated by day4 and outcome was seen in patients whose crp failed to decrease by 50% or less
Conclusion: Crp is a reliable and sensitive marker for correlating with the severity of cap , length of stay and outcome.
CURB65 being a clinical score is adequate risk stratification model and is comparable to crp levels. Though crp levels >100mg/l are more sensitive in identifying the mortality in patients of cap.
Low crp levels <100mg/l effectively excludes severe community acquired pneumonia and can be used to clinical judgement to identify low risk patients who may be safely discharged ,as crp <100mg/l provides a high negative predictive value comparable to CURB65.

INTRODUCTION

Pneumonia is an infection of the pulmonary parenchyma. It can vary from inactive to eruptive in presentation and from mild to fatal in severity. Community-Acquired Pneumonia (CAP), is an important cause of morbidity and mortality worldwide.[1].Community-acquired pneumonia (CAP) continues to be a worldwide health problem. Its annual incidence is 0.3–0.5% in the adult population, and mortality reaches 5–15% in admitted patients, thus representing the leading cause of death from infectious disease, [2,3,4] as reported by the ERS (European Respiratory Society) [2] and found in data from the USA [5,6] This justifies the interest in identifying prognostic factors and developing tools able to predict mortality. Community-acquired pneumonia (CAP) represents a significant therapeutic trial to physicians, as they have to decide whether the patient is to be treated in a clinic or need any ICU setting. Therefore, it is vital to assess the severity of the disease, as it forms a starting point in the management design and helps in settle agreeable patient outcomes. The need for an intensive care unit (ICU) is also a crucial problem for clinicians to deal during the course of CAP. [7] CURB-65 (confusion, urea nitrogen, respiratory rate, blood pressure, ≥ 65 years) and Pneumonia Severity Index (PSI) are the most oftentimes used scoring scales to assess the disease severity[8].C- reactive protein (CRP) is an acute phase protein produced primarily in the liver and is stimulated by cytokine release, primarily interleukin-6. Small studies suggest that an elevated CRP is relatively nonspecific and is not directly related to severity [9]on the basis of this evidence, the 2004 update of the British Thoracic Society (BTS) guidelines

Corresponding author:* **Mir Nadeem
Department of Medicine Gmc Srinagar and Associated Hospital

does not recommend admission CRP as a marker of severity. However, the guidelines recommend measurement of CRP as a useful marker of treatment failure in community- acquired pneumonia[10] A CRP that fails to fall by 50% or more within 4 days of admission is indicative of adverse outcomes such as empyema[11]It is well recognised that elevated concentrations of pro inflammatory cytokines correlate with severity and outcome of sepsis[12,13] and it has been shown that elevated CRP is an independent predictor of mortality in acutely ill patients[14].

Aims and Objectives

To correlate C-reactive protein levels with curb 65 score in mortality and outcome of community acquired pneumonia

MATERIALS AND METHODS

This prospective study was conducted in department of pulmonary and internal medicine skims soura. All patients who attended medical out patient department (opd) and the patients who were admitted with provisional diagnosis of community acquired pneumonia were taken in the study and the total of 60 patients were studied All the eligible patients with diagnosis of CAP who did no required hospitalisation were put on empirical antibiotic therapy and were followed on old basis and were contacted on telephone[15]. Patients admitted directly to internal medicine ward or through emergency were assessed within 4 hours of admission. The initial assessment included detailed history and clinical examination. Routine investigation at admission included complete blood count with ESR ,kidney function test ,liver function test ,LDH ,arterial blood gas analysis , chest roentgenogram, ECG, thoracocentesis with analysis of pleural fluid (ph, total cell count , differential cell count , LDH , amylase ,gram staining and culture). Gram staining and culture of respiratory secretions and blood culture were performed where ever feasable /indicated . A semi quantitative test for CRP was performed at admission and repeated at day 4. The CRP kit used was manufactured by Randox laboratories ltd. with clinical assessment and initial lab investigations curb 65 score was calculated in all patients.

Inclusion Criteria

The main inclusion criteria was presentation to hospital with diagnosis of community acquired pneumonia (CAP) .CAP was define dasperi dea guidelines

Exclusion Criteria

Hospital acquired pneumonia ,active thoracic or extra thoracic malignancy ,conditions likely to cause diagnostic confusion or where chest radiographic changes are equivocal (pulmonary fibrosis ,allergic bronchopulmonary aspergillosis), chronic lung disease (COPD, bronchiectasis, chronic asthma), immunosuppression, solid organ transplant ,chronic liver disease, haematological disorders including malignancies, other acute co-morbid illness leading to physiological or metabolic derangements such that pneumonia severity assessment would be inappropriate (eg acute pulmonary embolism, cystic fibrosis, steroid use)

Statistical Analysis

All data were analysed using SPSS version 20 (SPSS Inc., Chicago, Ill). Descriptive statistics of demographic and clinical variables are presented as median (interquartile range) unless otherwise stated. The Mann-Whitney U test was used for the comparison of 2 groups of continuous data. Sensitivity, specificity, negative predictive value, positive predictive value, and the area under the receiver operator characteristic (ROC) curve was use for comparison of predictive tests. A 2 2 table using the Fisher's exact test was used to compare readmissions before day 4. For all analyses, a 2-tailed P value of <.05 was considered statistically significant. We used multiple logistic regression to compare the outcomes of interest in patients with elevated CRP (100 mg/L) compared with patients with lower CRP levels (100 mg/L).outcome to be seen the primary outcome of interest was 30-day mortality. Secondary outcomes were need for mechanical ventilation and/or inotropic support and development of complicated pneumonia (lung abscess, empyema, or complicated para- pneumonic effusion).

RESULT

In our study we took a total number of patients 60 in number and the age distribution ranged from 16 to 80 years with mean age of 48.70 ±17.15 years ,there were 32 females (53%) and 28 males (47%). The youngest patient was 16 yrs old female. Presenting symptoms of patients are directed in table 1

Table1 symptoms on presentation in studied patients n=60

Symptoms	Number n=	Percentage (%)
Cough with expectoration	60	100
Breathlessness	39	65
Altered sensorium	27	45
Hemoptysis	6	10
Pleuritic chest pain	2	3

Table 2 Signs in patients n=60

	Number n1	Percentage (%)
Crepts	54	90
Bronchial breathing	24	40
Pleural rub	12	20
Signs of effusion	10	16
Wheeze	6	10
Tachycardia	30	50
Encephalopathy	27	45
Fever	48	80
Hypotension	18	30
Hepatomegaly	3	5

Patients were examined for the signs which are directed in table 2. It was observed that CRP levels were significantly increased in 45% of patients. The raised cap levels in studied patients was associated with increased mortality and morbidity and crp was repeated by day4 and outcome was seen in patients whose crp failed to decrease by 50% or less as depicted in table 3.

Table 3 outcome of patients whose crp failed to decrease by 50% or less on day 4

n=	Mortality 30 days	Invasive ventilation/ionotropic support	Complicated pneumonia
16(12%)	7(58%)	8(66%)	1(8%)
Outcome of patients	Whose crp decreased to 50% or less on day 4		
44(88%)	4(9%)	6(13%)	4(9%)
	Patients improved after initial fall in crp n1= 30(68%)		

We also calculated CURB65 score at time of admission and saw the correlation with outcome, as depicted in table 4.

Table 4a CURB65 >3 and outcome/mortality

	No	yes	Total
Test positive	15	10	25
Test negative	33	2	35
total	48	12	60
	Estimated value	95% confidence interval	
		Lower limit	Upper. Limit
Prevalence	0.066667	0.021572	0.170059
Sensitivity	0.5	0.091899	0.908101
Specificity	0.553571	0.415568	0.684241
Likelihood ratio(LR+)	1.12	0.403	3.114
Likelihood ratio(LR-)	0.903	0.333	2.474
Odds ratio (OR)	1.2	0.114	13.555
Relative risk (RR)	1.222	0.126	11.869
Positive pridictive value	0.074	0.021	0.234
Negative predictive value	0.939	0.804	0.983
Table 4b	CHI- SQUARE tests		
test	CHI-SQUARE	P value	
Pearson uncorrected	0.043	0.835	
Yates corrected	0.000	1.000	
Mantel- haenszel	0.043	0.839	

Crp as a predictor of severity as compared to CURB65 score is shown in table 5,6,7

Table 5 prediction of 30 day mortality

	CRP> 100mg/l	CURB-65 ≥3
Sensitivity	92%	83%
Specificity	67%	69%
Positive predictive value (PPV)	40%	40%
Negative predictive value (NPV)	97%	94%
Odds ratio	22	11

Table 6 prediction of need for ventilation and or inotropic support

	CRP> 100mg/l	CURB-65 ≥3
Sensitivity	92%	90%
Specificity	67%	69%
Positive predictive value (PPV)	40%	40%
Negative predictive value (NPV)	97%	97%
Odds ratio	22	22

Crp as a predictor of severity as compared to CURB65 score is shown below

Table 7 predictor of complicated pneumonia

	CRP> 100mg/l	CURB-65 ≥3
Sensitivity	50%	75%
Specificity	55%	61%
Positive predictive value (PPV)	7.4%	12%
Negative predictive value (NPV)	94%	97%
Odds ratio	1	4

DISCUSSION

CRP being an acute phase reactant needs thorough observation in infectious diseases and our study concentrated on observation and comparison with already recommended clinical and biochemical scoring system. In present study mean age of patients was 48.70±17.15 years (16-80yrs) with 32 females ad 28 males. The common symptoms of patients was cough with expectoration (100%), breathlessness (65%), altered sensorium (40%) hemoptysis (!0%) and pleuritic chest pain(3%) which was consistent with study carried out by Naoyuki Miyashita *et al*[16]. The signs present 80% of patients were febrile, 30% had hypotension on presentation , 50% tachycardia ,90% had crepts, 40% bronchial breathing 20% pleural rub and 16% signs of effusion as also seen by S.bansai *et al* [17]. In our study the 30 day mortality was 20%, poor prognostic factors in these patients was seen to be were age above 60yrs ,staphylococus pneumonia and undetermined ethology on culture , altered sensorium , respiratory failure , hypotension ,leucocytosis coinciding with findings by pachon j *et al* [18]. These findings emphasise the need of further investigation in patients in whom the poor prognostic factors are present at time of admission so to establish early treatment and thereby reducing mortality. In the present study it was seen elevated CRP≥100/l was associated with increased 30 day mortality not only that but it was also the marker of requirement of inotropic support and mechanical ventilation with better sensitivity than CURB65.

The study also showed high negative predictive value of crp< 100mg/l for each these outcomes can reassure the clinician and has the potential to aid the initial decision to admit or treat patient on opd basis, these findings were similar to study done by James D.Chalmer *et al* [19]. on comparing the parameters its seen that crp≥100 is better predictor of 30 day mortality than CURB65 as in sensitivity and negative predictive value where as prediction of development of complicated pneumonia and use of ventilator and inotropic support CURB65 is a better tools as also seen by James D.Chalmer *et al* [19]. One of the main advantage of crp is that serial measurements can be taken as a marker of treatment response also. A fall in crp level on day 4 of admission is independently associated with increased 30 day mortality, need for ventilation and inotropic support, and complicated pneumonia. Hence crp has shown better predictability in 30 day mortality compared to CURB65 and can be used as independent predictor or in combination with CURB65 score for better outcome of patients. Also as CURB65 can have inter observer variations in clinical assessment and judgment CRP can be used with less biasing and inter observer variations.

CONCLUSION

1. Crp is a reliable and sensitive marker for correlating with the severity of cap , length of stay and outcome.
2. CURB65 being a clinical score is adequate risk stratification model and is comparable to crp levels. Though crp levels >100mg/l are more sensitive in identifying the mortality in patients of cap.
3. Low crp levels <100mg/l effectively excludes severe community acquired pneumonia and can be used to clinical judgement to identify low risk patients who may be safely discharged ,as crp <100mg/l provides a high negative predictive value comparable to CURB65.

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