Original Research Paper

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Pulmonary Medicine

CORRELATION OF IN-LAB PLEURAL FLUID GLUCOSE MEASUREMENT WITH BED-SIDE PLEURAL FLUID GLUCOSE MEASUREMENT BY GLUCOMETER

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ABSTRACT Measurement of the pleural fluid glucose level is helpful in the differential diagnosis of exudative pleural effusions.This prospective study was carried in 94 patients recruited from January 2016 to June 2017 at a Tertiary care centre.Patients with clinico-radiologically confirmed pleural effusion were subjected for thoracocentesis and pleural fluid was tested simultaneously for glucose by glucometer method and In-Lab enzymatic method.These included 49 Tubercular pleural effusion, 31 Tuberculous empyema,6 bacterial empyema,4 malignancy and tubercular pleural effusion with diabetes each. Mean pleural fluid glucose (in mg%) of 94 patients by strip method is 73.64 and by laboratory method is 59.32 (diff = 14.32). The pleural fluid glucose calculated by either method is almost comparable in case of tubercular pleural effusion,empyema ,bacterial empyema,&malignancy cases .It shows great variation in patients having diabetes with pleural effusion.

KEYWORDS : exudative pleural effusion, Empyma, Tuberculor, Malignancy, glucometer

INTRODUCTION:

Pleural effusion is a common manifestation of variety of diseases so it can represent as a vast variety of differentials .So for exact etiological diagnosis of pleural effusion a systematic & structured approach should be required. The approach should allow minimal invasive procedure & less time consumption. For appropriate diagnosis of pleural effusion stepwise approach is required which include proper clinical history & physical examination, radiological confirmation with chest x-ray, ultrasound chest ,CT thorax wherever applicable. Role of thoracocentesis is equally important in reaching up to exact diagnosis. Pleural fluid analysis in the form cellular picture, biochemical investigations ,microbiological investigations, cytology should be required for exact diagnosis. To reach up to an accurate diagnosis of the cause of pleural effusion, first we broadly divide it into transudate versus exudates which depends on light's criteria[1] can be

used. Biochemical test are equally important like in case of low pleural fluid pH & low glucose & high LDH suggestive empyema, while pleural fluid ADA helps in finding out tubercular etiology. Measurement of the pleural fluid glucose level is helpful in the differential diagnosis of exudative pleural effusions. A low pleural fluid glucose level (<60 mg/dl) can be seen in one of four disorders, like a parapneumonic effusion, malignant disease, rheumatoid disease, or tuberculous pleuritis. The very low pleural fluid glucose level can be seen in complicated parapneumonic effusions or empyemas & it is a poor prognostic sign in case of parpneumonic effusions & empyemas may require ICD insertion or thoracotomy to break down adhesions & loculations[2,3]. Approximately 15% to 25% of patients with malignant pleural effusions have pleural fluid glucose levels below 60 mg/dl,and the level may be less than 10 mg/dl[4,5,6]. Lower the pleural fluid glucose level more chances of pleural fluid cytology & pleural biopsy to came positive & also there are chances of failure of chemical pleurodesis & decrease in life expectancy.[7,8,9,10]

MATERIALS AND METHODS:

All patients presenting to respiratory medicine department of tertiary care hospital with diagnosis of pleural effusion and radiologically confirmed pleural effusion will be included into the study after taking informed consent.

Study design: Prospective study

Inclusion criteria: All patients aged above 12 years with confirmed diagnosis of pleural effusion

Exclusion criteria:

1.Patients below 12 years age.
2. Patients with deranged hematological parameters.
3. Patient not giving consent

Pre-Procedure Work Up-

1. Detailed recording of history.
2. Complete physical and systemic examination.
3. Vitals (pulse, Blood pressure,Oxygen saturation,Respiratory rate and temperature).

Technique Of Thoracocentesis: After giving Intramuscular 1 cc atropine and proper position to the patients exact site of the pleural fluid aspiration decided on the basis of clinical examination by percussion & auscultation method & also with radiological findings. Exact site mark was done.

- The assembly of the 20cc leur lock syringe, three way canula,20G needle with infusion set with empty NS bottle made ready .
- Cleaning & draping done with the spirit, betadine & again with spirit , steridrape applied at the site of the pleural fluid aspiration .
- Inj lignocaine 2% taken in 10 cc syringe it is infilterated through the skin in subcutaneous part to anaesthetize the local site of pleural fluid aspiration. Gradually needle advanced with aspirating & stopped once pleural fluid aspirated & confirmed.
- After that at same site three way canula with 20G needle & 20 cc leur lock syringe assembly needle is inserted with gradual aspiration fix the needle at free flow of fluid aspirate fluid with help of 20 cc syringe & with the help of three way canula fluid is collected in empty NS bottle.
- In one setting around 800 to 1 litre fluid can be aspirated. After that procedure can be stopped seal the site of puncture with tincture benzoin.
- Procedure can be withheld in between when patient complaining of chest pain or shortness of breath.
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Collection and handling of pleural fluid sample:

The pleural fluid which is aspirated immediately collected in a sterile container which is send for appropriate investigations like for cellular picture, biochemical ,& microbiological investigations . Pleural fluid which was aspirated tested immediately for glucose by glucometer method . Pleural fluid was simultaneously sent for biochemical laboratory for glucose estimation by enzymatic method. Results of both tests are compared in all the patients and each disease group.

Post Procedure

Vitals, SpO2 and breath sounds were checked immediately after the procedure and all patients were subjected for CXR after 2 hrs.

Diagnosis and cause of pleural effusion was identified based on clinical findings and cytological,biochemical ,microbiological evaluation of pleural fluid.

RESULTS:

94 patients were recruited into the study which were categorised according to the diagnosis and cause of pleural effusion as 49 patients of Tubercular pleural effusion, 31 patients of Tuberculous empyma,6 patients of Baterial empyma,4 patients of Malignantpleural effusion and 4 patients of Tuberculous pleural effusion with Diabetes mellitus.

Mean pleural fluid glucose (in mg%) of 94 patients by strip method is 73.64 and by laboratory method is 59.32 (diff = 14.32). In the tuberculous group, pleural fluid glucose by glucometer method & laboratory method is 98.36 and 82.75(diff =15.61) respectively.In the tubercular empyema, it was 21.64 &12.1(diff = 9.54); while in bacterial empyema it was 21.83 & 11.33 (diff = 10.50),in the malignancy group it was 71&62.75 (diff =8.25),in tubercular pleural effusion with diabetes is 254.2 and 206.7 (diff = 47.5) respectively.

DISCUSSION:

In this study mean pleural fluid glucose in 94 patients by Glucometer strip method and In-Lab enzymatic method was 73.64 and 59.32 respectively,with difference between the two methods being 14.32.These findings are consistent with the study by H. Bhardwaj et al.[11] in which a total of 23 patients were enrolled and the mean difference between the 2 method was 0.9 mg/dl illustrating very good correlation between Glucometer strip method and In-Lab enzymatic method.

Difference in Pleural fluid glucose measurement by Glucometer and in-lab enzymatic method in tuberculous group,tuberculous empyma group,bacterial empyma group,malignant group and tuberculous effusion with DM group was 15.61,9.54,10.50,8.25 and 47.5 mg/dl respectively.

CONCLUSION:

The pleural fluid glucose calculated by glucometer method is almost comparable with that calculated by enzymatic method in laboratory in case of tubercular pleural effusion, empyema ,bacterial empyema, &malignancy cases .It shows great variation in case diabetes with pleural effusion .Glucometer is easily available bedside and can be used to aid diagnosis in resource limited settings .It is cost effective(approximately 6 times).

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