VOLUME-7, ISSUE-5, MAY-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Medical Science

QUADRANGULAR ELOESSER FLAP VERSUS CLASSICAL RIB RESECTION & OPEN DRAINAGE TECHNIQUE: A PROSPECTIVE RANDOMISED STUDY OF CHRONIC ORGANISED EMPYEMA AND ITS OUTCOME

Dr. Arun Kumar Haridas Associate Professor and HOD Department of CTVS, Dhiraj Hospital, Vadodara, Gujarat

Dr. Bharathi Shridhar Bhat * Senior Resident MCh (CTVS) Department of CTVS, Dhiraj Hospital, Vadodara, Gujarat *Corresponding Author

ABSTRACT

Back ground: Chronic organised empyema, due to tuberculosis, still pandemic in developing countries. It is more difficult to cure due to complexity of disease and stages. Technique of needle aspiration of pus, intercostal drainage tube insertion works in early stage. Decortication, rib resection and open drainage, Eloesser Flap and Thoracoplasty are required for late stage, hence the treatment to be decided on the basis of stages of chronic empyema and status of the underlying functioning lung.

Objective: To compare and evaluate outcome of classical rib resection and open drainage versus quadrangular Eloesser Flap technique, in chronic organised empyema patients.

Method: We studied 100 patients, suffering from chronic organised empyema. Divided them in, 50 each group randomly and treated them with two different surgical techniques. Classical rib resection and open drainage done in group A and ours new technique quadrangular Elloesser Flap technique used for group B. Procedures done only in patient who had fixed mediastinum.

Result: Majority were suffering from tubercular organised empyema. Quadrangular Eloesser Flap had greater advantage in survivality, early mobilization, reduction in sepsis, easy to manage wound, longer patency of fistula and higher lung expansion.

Conclusion: Quadrangular Eloesser Flap technique is far superior than contemporary techniques. It should be primary modality of treatment in organised chronic tubercular empyema with fixed mediastinum and or underlying diseased lung.

KEYWORDS : Empyema, Tuberculosis, Pleural Effusion, Eloesser Flap

Introduction

Chronic empyema is commonest case, that thoracic surgeon come across in developing countries. They are either due to pyogenic or tuberculosis, rarely post traumatic and sometimes lung and pleural malignancy masquerade as empyema.

It requires multimodality treatment, promptly at appropriate time to reduce morbidity and mortality.[1]

The basic goal of treatment remains standard, control the infection, drain the pus and make pavement for early lung expansion.[2,3]

Chronic empyema does not respond to monotherapy, rather it is more complex and status of underlying lung and stage of empyema directs the type of treatment[3].

Majority of pyogenic organised chronic empyema with matured cortex on visceral pleura can be treated successfully by Decortication and that should be primary mode of management. Earlier is the intervention better the outcome[4].

Mere, Anti-tuberculosis drug alone never extenuate the complications of pulmonary tuberculosis.[5]

Though multimodality therapy is required but it is more complex. Controversy exist regarding timing and technique of therapy.[6,7]

Tubercular organised empyema are not ,only associated with non elastic and sometimes calcified cortex but also underlying lung plastered to mediastinum. It is associated with fibrosis or multiple fibrocavitary lesions in the lung, also unusually huge and multiple bronchoplural fistula lead to difficult to treat such patient with mere ICD or Decortication, if tried majority end up unsuccessful.

In the Preantibiotic and pre antitubercular drugs era, empyema was debilitating disease with immense morbidity and mortality .Surgery was in front role and to a great extent it could help to alleviate symptoms.

Though open thoracotomy was in vogue but it was Leo Eloesser popularised this technique with unique tongue like unidirectional flap, now known as Eloesser flap. It was modified by number of surgeons to simplify the technique to use it in all spectrums of empyema patients. Commonest indication of Eloesser Flap were, para pneumonic effusion and post lung resection empyema.[8]

With improved clinical knowledge and investigative advancements, helped for early diagnosis of empyema and same time advanced antibiotics, anti tubercular drugs, better lesser invasive treatment, led to surgical option of elloesser flap, either out of vogue or forgotten in western countries. In developing world, not only chronic empyema is rampant. There is high prevalence of pulmonary tuberculosis and its complications. So still we contemplate regularly, rib resection and open drainage, modified eloesser flap surgeries. Both have great role in alleviating morbidity and mortality due to organised chronic empyema. More than 30% of the thoracic work involves surgical management of chronic empyema in our centre and same with other centres well in India.

SUBJECT AND METHOD

Subjects

This prospective comparative study was done over period of 3 years, from January 2015 to January 2018. 100 cases of chronic empyema referred from chest medicine dept from our own hospital and elsewhere after failed trials of lesser invasive treatment including multiple times ICD insertion were selected. We had divided them in to two groups randomly, including alternative case in each group. First group A (n-50) underwent elective classical rib resection and open drainage and second group B (n-50) underwent our modified quadrangular eloesser flap procedure. Patient with chronic empyema without mediastinum fixed, patient having major BPF with signs of desaturation were excluded from our study. Preoperative, informed consent was taken in both groups. Study got prior approval from institute ethical committee.

Method

All patients underwent routine investigations along with sputum and Pus for AFB staining, HIV and HbsAg status, CT chest scan plain and contrast done to evaluate extent of disease, underlying lung status, septation and loculations. All patients underwent pre

anaesthetic check-up.

All surgery was done general anaesthesia with appropriate lifelines. Majority of patient had single lumen Endo Tracheal tube used according to weight and age. Double lumen ET tube was inserted in patient who had BPF to avoid spill over to contralateral normal lung. Patient was put in lateral position with diseased lung of interest on the upper side in both groups.

Incision was taken on the most dependent position between anterior axillary line to posterior axillary line by indirectly assessing dependent position of empyema base, by CT chest evaluation and by passing long artery instrument through the hole made by previous ICD site on table.

Group A- incision was deepened, underlying two ribs to length of skin incision excised. Underlying thickened parietal pleural excised to enter pleural cavity. Lung status along with whether mediastinum fixed or not, severity and number of BPF assessed. No attempts were made to close BPF .Cavity and surface of lung curetted, pus and muck evacuated. Skin edges marsupalised to cut edges parietal pleura of respective side using no 1 vicryl. Hinge of edge formed by junction of pleura cutanious suture line .Pleural cavity washed with saline mixed with betadine 5% (500ml Luke warm + 50 ml betadine). Empty cavity packed with betadine soaked roller bandage. (Figure-1)

Figure-1 classical rib resection & open drainage

Group B – incision was deepened .underlying minimum 3ribs, about 2cm beyond length of original skin incision excised, so that at least lower hilum of lung visualised without difficulty. Excision of parietal pleura underlying, with margin of 2 cm beyond, rib which is left behind intact. If hilum not seen than may be upper one or more rib need to be excised .Lung and parietal pleural surface currated, pus with muck evacuated. Skin flaps elevated superiorly, inferiorly, medially and laterally like tongue of classical Eloesser flap, after appropriate 3 to 4 cm long skin incision. Skin inverted and sutured to cut edges of parietal pleura using no 1 vicryle on respective side. Hinge of edge on all four sides formed exclusively by skin which is inverted inside the cavity. The Cavity washed and packed with betadine soaked roller bandage.(Figure-2)

Figure -2 Quadrangular Eloesser Flap techniques

All patients were extubated on the table. Pleura and pus sent for HPE and AFB staining respectively. All patients put on appropriate antibiotics for 5days .Preoperatively diagnosed, tubercular empyema patients, ATT drugs continued as per revised national TB program protocol[9].

Day one, after the surgery, roller bandage packs removed and cavity irrigated with 500 ml saline twice a day for five days and once a day after that. Patients, attenders were taught to irrigate cavity and technique of dressing under aseptic precaution, which they would do it regularly at their home after discharge. Patient's outcome compared under different parameters subsequently.

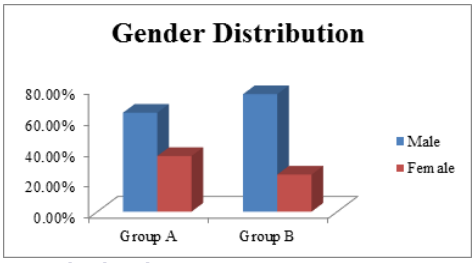
Statistical Analysis

The statistical software used for statistical analysis is SPSS 20.
We have applied chi square test to find significant level between two groups.

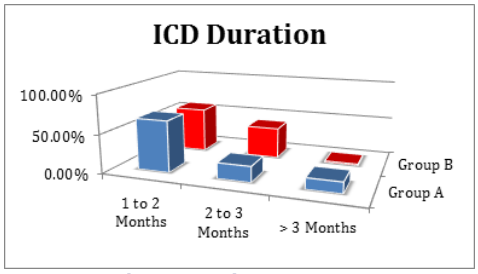
P value less than 0.05 was considered as significant value.

Result

In our study, male preponderance found. Group A had 32 (64%), group B 38(76%) males (Graph-1) .Mean age was 33.4 years and 37.26 years, in respective group. Majority of the patients have had, multiple lesser invasive intervention including ICD insertion for two month or more before chest physician referred such cases to us (Graph-2) .Nearly 90% cases proved chronic organised tuberculosis.



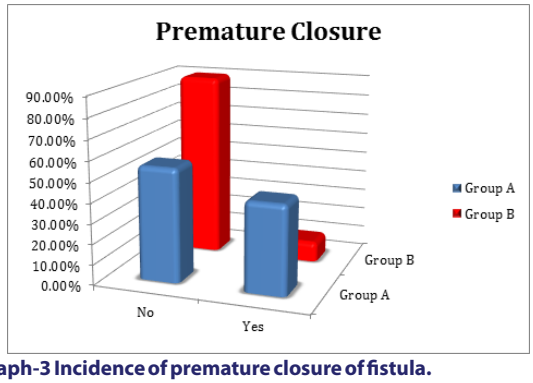
Graph-1 Gender distribution.



Graph-2 Inter Costal Drainage duration prior to surgery.

About 10% patients were associated with diabetes mellitus. Significant number of cases had multiple bronchoplural fistulas (BPF). Group A, 22% and Group B, 28% cases had BPF. We found equal number of cases in both groups, involving right and left lungs. In Group B eight (14%) cases were in septicaemia compared to Group A, one (2%) at the time of presentation.

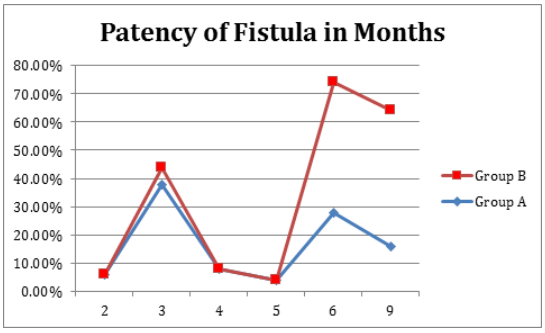
Evidently ,there was high incidence of premature closure of fistula (Graph-3) from group A that is 22(44%) cases compared to Group B five(10%) cases (p value 0.0001) hence , high rate of redo surgery in group A that is ten (20%) cases compared to group B,none had redo surgery (p value 0.0010).



Graph-3 Incidence of premature closure of fistula.

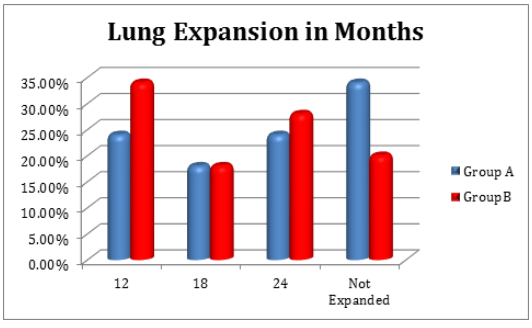
In our study, six (12%) patients from group A and one (2%) patient from group B, died post operatively due to septicaemia.

In group A 54 % of cases, fistula patent only for four month compared to 95% of cases in group B, fistula patent till nine month on an average (p value 0.005), so it helped to control sepsis better in later group.(Graph-4)



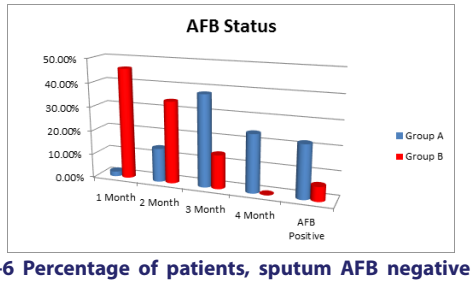
Graph-4 Duration of patency of fistula.

Underlying diseased Lung expansion was slow and progressive in both groups. At the end of three years study, 66% of lungs in group A and 80% of lungs from group B expanded.(Graph-5)



Graph-5 Incidence of diseased lung expansion after surgery.

There was an Interesting observation in proven tuberculosis patient, who were on Anti Tubercular Treatment. only 2% of cases in group A turned in AFB negative on sputum and pus analysis compared to 46% cases in group B within first month of surgery (p value 0.0001).At the end of four months, 79% cases from group A and 94% in group B, sputum and pus for AFB turned into negative(p value 0.041) .(Graph-6)



Graph-6 Percentage of patients, sputum AFB negative after surgery.

Mean duration of stay was eight days. Total 14% cases in group A and 48% patients in group B discharged on post operative day eight successfully (p value 0.002).

Discussion

Empyema or Dropsy, born with the human race and so is the treatment. Open drainage for empyema was mentioned by Hippocrates and sushrutha.[11] In 1919, sir William Osler described first time rib resection and open drainage in literature.[12] it is in 1935 Leo eloesser described, what is called now with eponym "Eloesser Flap"drainage technique. [13]

Leo Eloesser's realization of plastered lung in tubercular empyema, he put the "U" shaped incision over the empyema, skin flap raise above head end side. Underlying 2to3 rib excised and pus drained. Tongue shaped flap inverted upwards, sutured to underlying pleura. Remaining raw edges of skin in lower end approximated so pus drained out but no air entered maintaining negative pressure.[13] Panagiotis symbas, in 1971 modified Eloesser technique and promoted its usage even in non tubercular empyema. He had put inverted "U" shaped incision on most dependent part of empyema, based on diaphragm. Lower tongue shaped flap sutured to diaphragm. Upper raw edges sutured together like original Eloesser Flap.[14]

Clagett and Geraci, in1963, did technique of wide open rib resection and open drainage. Once drainage stopped then they filled the cavity with antibiotic solution and closed the fistula by approximating skin.[15]

For organised chronic empyema anything lesser invasive treatment other than Decortication and open drainage, end up prolonging morbidity and increases mortality .Rather interesting to see in one of the study, majority patient remain unsatisfied for being struck with ICD for months together with no conclusive result.[16]

Decortication, what few physician advice in all empyema cases, rarely works for organised tubercular empyema as matured cortex plastered to the lung, any attempt to peel cortex in such cases, ends up in incomplete Decortication, non expansion of lung, persistence of peumopocket, increased bleeding and dreaded air leaks. So it cannot be primary or alternative procedure particularly in organised empyema with plastered lung with BPF.[17]

Role of thoracoplasty limited in present scenario in chronic empyema ,which is mutilating and cosmetically not appealing other than in selected cases of post lung resection empyema with permanent persistent cavity .[18]

Anything lesser than open drainage , either in the form only Anti Tubercular Treatment, Needle aspiration and even Intercostal Drainage alone, only increases patient morbidity and delays earning his livelihood. It also keeps him away from his personal and family life .We had come across, people with ATT and ICD roaming around year or more. It is only open drainage and ATT gives solution to all the above issues.

Classical technique of rib resection and open drainage consumes less time to operate. But it needs patient to lie down on his side to irrigate cavity, because fistula would be with the narrow tract. Sometimes it is disastrous, if an irrigation fluid spills in to contralateral lung due to patent BPF. Profoundly Increased incidence of premature closure of fistula lead to increased incidence of re empyema like situation with sepsis, in turn such patients needs multiple redo surgery to recreate fistula to control sepsis .So it increases not only morbidity but extra financial burden.

Over 15 years of extensive study of such patients and experience of doing rib resection and open drainage regularly with observation of its short coming led to modify technique.

Advantage of quadrangular Eloesser Flap is ease of irrigation of cavity under vision, ease of irrigation in upright position particularly in patients who are associated with major broncho pleural fistula, it prevents aspiration and spill over to contralateral lung. Delays premature spontaneous closure of the fistula lead to better chance of infection control. It avoids broad spectrum antibiotics usage for long term due to early sepsis control. Hastens patients early mobilization .it avoids re empyema complications and redo surgery. Ultimately improves chance of survivality, drastically reduces morbidity and majority diseased, lung function reverted back over a period of time.

Conclusion

Stephen Paget 1896, aptly said, "one might add a score of case to show that an unhealed empyema is, as a rule, the directly result of the patient neglect, or of the surgeon delay, or of inadequate and useless surgery; but our business now is to enquire how we may most surly and safely cure it"

Time to reemphasize, proven pyogenic or tubercular organised empyema with evidence of lung collapsed after ICD insertion, associated BPF, underlying fibrosis or fibrocavitatory lesion ,with or with ATT promptly and optimally treated by rib resection and open drainage.

Modified quadrangular elloesser flap should be the primary treatment for chronic organised empyema irrespective of cause. It has edge over other open drainage techniques, in early control of sepsis, ease of irrigating thoracic cavity, promptly help to ambulate patient and faster chance to go back and earn his livelihood. It has least chance of premature fistula closure so avoids redo surgery; eventually prevents recurrent sepsis, morbidity and mortality.

It is the mainstay treatment for tubercular or non tubercular empyema with fixed or plastered mediastinum, with or with BPF.

Reference

1. Thourani VH, Lancaster RT, Mansour KA, et al. Twenty-six years of experience with the modified Eloesser flap. Ann Thorac Surg 2003; 76:401 - 406.
2. LeMense,G.P.,Strange.c,Sahn.S.A. Empyema thoracis (therapeutic management and outcome). Chest 1995; 10:1532-1537.
3. Hayes, S.W: Tuberculous Empyema. Diseases of the chest 1937; 3(1): 15-17
4. Thurer RJ. Decortication in Thoracic Empyema, Indications and Surgical Technique. Chest Surg Clin N .Am 1996; 6:461-490.
5. Yim AP. The role of video-assisted thoracoscopic surgery in the management of pulmonary tuberculosis. Chest 1996 Sep; 110(3):829-32.
6. Prakash B, Khare P, Bhatnagar AK. Tuberculous empyema thoracis: clinical, bacteriological features and its medical management. Int J Sci Stud 2015; 3(6):120-5.
7. Thourani,V.H.,Brady,K.M.,Mansour,K.A.,Miller,J.I. Jr,Lee,R.B. Evaluation of treatment modalities for thoracic empyema (a cost-effective analysis) . AnnThoracsurg 1998;66: 1121-1127.
8. Miller, J.I. Jr. The history of surgery of empyema, thoracoplasty, Eloesser flap, and muscle flap transposition. Chest Surg Clin N Am 2000; 10: 45–53.
9. Denlinger, Chadrick E. Eloesser Flap Thoracostomy Window.Operative Techniques in Thoracic and Cardiovascular Surgery 2010; 15(1): 61 – 69.
10. Central TB Division (India). Revised National Tuberculosis Control Programme. Training Course for Program Manager (Modules1-4); April, 2011.
11. Sathish HS, Rashmi TM, Mithun B, Narmada MG. Sushruta's Method not Hilton's Method. Journal of Ayurveda Physicians and Surgeons 2017 (July); 4(3):52-54.
12. Qais M. Ali .Open Drainage with Rib Resection in The Treatment of Organized Thoracic Empyema MMJ 2010; 9(1):67-70.
13. Eloesser L. An operation for tuberculos empyema. Surg Gynecol Obstet 1935; 60:1096-1097
14. Symbas PN, Nugent JT, Abbott OA, et al. Nontuberculous pleural empyema in adults. Ann Thorac Surg 1971; 12:69-78.
15. Clagett OT, Geraci JE.A procedure for the management of postpneumonectomy empyema. J Thorac Cardiovasc Surg 1963; 45:141-145.
16. Kamat SR, Kudalkar SS, Maydeo DV, Walimbe S, Kulkarni KG, Hanmantgad RR, et al. A prospective study of 100 cases of chronic empyema in Bombay. Lung India 1985; 3:15-9.
17. Ashbaugh DG. Empyema thoracis. Factors influencing morbidity and mortality. Chest 1991; 99:1162-5.
18. Terrence P, Horrigan, MD, Norman J, Snow, MD. Thoracoplasty: Current Application to the Infected Pleural Space .Ann Thorac Surg 1990; 50:695-9.