British Journal of Medicine & Medical Research
16(10): 1-6, 2016, Article no.BJMMR.26598
ISSN: 2231-0614, NLM ID: 101570965

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Thoracoscopy as the Method of Choice in Diagnosis of Mediastinal Lymphadenopathy

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2016/26598
Editor(s):
(1) Syed Faisal Zaidi, Department of Basic Medical Sciences, College of Medicine, King Saud Bin Abdulaziz University-HS, National Guard Health Affairs, King Abdulaziz Medical City, Kingdom of Saudi Arabia.
Reviewers:
(1) Anonymous, Icahn Medical Center at Mount Sinai, New York, USA.
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(4) Einar Arnbjörnsson, Skåne University Hospital, and Lund University, Sweden.
Complete Peer review History: http://sciencedomain.org/review-history/15330

Short Research Article

Received 25th April 2016
Accepted 17th June 2016
Published 9th July 2016

ABSTRACT

Aims: Determining the role of minimally invasive surgery in elucidating and differential diagnosis of patients with mediastinal lymphadenopathy.
Place and Duration of Study: The research was carried out in the National Cancer Research Center, MoH RUz in the period of 2001-2015.
Methodology and Study Design: Results of 45 diagnostic video assisted thoracoscopic operations in lymphadenopathy of mediastinum were retrospectively studied. Men were 17 (37.8%), women were 28 (62.2%). The age of patients ranged from 12 to 62 years, the median age was 38,46±12,1 years. Adequate material for the morphological study obtained in 100% of cases.
Results: In histological examination malignant lymphoma was diagnosed in 23 (51%), mediastinal form of lung cancer in 3 (6.6%), tuberculosis of intrathoracic lymph nodes in 11 (24.4%), sarcoidosis in 8 (17.7%) cases. The mean operative time was 22.9±12,3 min. Narcotic pain medications were not used. No deaths were observed after the procedure.

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Conclusion: Videothoracoscopy showed high effectiveness and informativeness in the diagnosis of lymphoproliferative diseases of the mediastinum.

Keywords: Videothoracoscopy; lymphoma; mediastenum; diagnostics.

1. INTRODUCTION

Diagnostics of hilar lymphadenopathy and its dissemination remains as an important clinical problem because the differential diagnosis of these conditions include such diseases as tuberculosis, which causes epidemiological risk, tumors, interstitial diseases and granulomatosis [1-5,6,7,8,9-15]. Increasing the number of malignant processes in the mediastinum caused by lymphatic tumors, the frequency of which has increased more than twice over the past 15-20 years [2,4,8-18]. Currently morphological verification of the diagnosis is based on the data of cytological, histological, immunophenotypic, cytogenetic and molecular methods [6-8]. Especially important examination stage of the patient is receiving adequate biopsy material for morphological verification of the diagnosis. Treatment tactics, and prognosis of the disease depend on the morphological options in oncology and other diseases. Obviously, qualitative morphological diagnosis requires sufficient biopsy material [1,2,4,5,11,13,15,17,19,20].

Preparation of material for morphological studies of tumor tissue is not complicated in cases when the lymph nodes, organs and tissues are available for standard invasive research methods, but in the absence of peripheral lymphadenopathy biopsy of mediastinal lymph nodes using various diagnostic interventions such as transthoracic slice tumor biopsy, mediastinoscopy, thoracoscopy and diagnostic thoracotomy endobronchial ultrasound-guided transbronchial needle aspiration (EBUS TBNA) are indicated. Considering the invasive nature of these techniques and often severe condition of patients, the intervention needs the right choice, taking into consideration of safety and tumor localization [1,3,4,7-9,12-14].

Each upper mentioned method has its advantages and disadvantages. As literature states, specificity of EBUS TBNA, as the other invasive methods is 100%. Sensitivity is around 71.8%-90%. Also, for performing EBUS TBNA conducting combined bronchoscopy in operation room conditions and general anesthesia with high frequency mechanical lung ventilation is vital. In standard mediastenoscopy it is technically impossible to get to the sub-aortal (#5) and anterior mediastenal (#6) and lung root lymph nodes.

One of the clearest examples of the successful introduction of new technologies in medical practice is endosurgery [1,2,3,4,6,7,9,11,14, 19,20]. In oncology, the possibility of visual inspection of organ, the affected tumor process, determining the degree of tumor invasion and, most importantly, the establishment of morphological structure of the tumor in some cases endosurgery method leads to a preferential versus other diagnostic tests status. [1,3,4,7-19,21,22]. Usage of endosurgery for diagnostic purposes is aimed mainly for clarifying the nature of the changes identified by using non-invasive methods, such as X-ray, X-ray computed tomography (CT), magnetic resonance imaging (MRI), ultrasound (US) and radioisotope studies. Tumor, which was identified by upper mentioned methods needs to be verified in histological examination. This problem can successfully be solved with biopsy under control of video assisted thoracoscopic surgery (VATS). The sensitivity of the method is higher than 95-96% [1,5-7].

To determine the role of minimally invasive surgery in qualifying and the differential diagnosis of patients with suspected lymphoproliferative disease, retrospective analysis conducted on results of diagnostic VATS interventions among patients hospitalized in the Thoracic Department of the National Cancer Research Center, Ministry of Health of the Republic of Uzbekistan from 2001 to 2015 with affection of mediastinal organs. The aim of VATS operations was establishing final diagnosis for solving and definition of further treatment tactics. Purpose of the research was to examine the results and determine the diagnostic value of VATS in malignant lymphomas with mediastinal lymph nodes.

2. MATERIALS AND METHODS

Results of 45 diagnostic VATS operations in lymphadenopathy of mediastenum were studied. Men were 17 (37.8%) and women were 28

(62.2%). The age of patients ranged from 12 to 62 years, the median age was 38,46±12,1 years.

To evaluate the general condition of the patient, verification of the tumor process comprehensive examinations as general clinical analysis, standard biplane chest X-rays, bronchoscopy, transthoracic puncture of the tumor (by indication), cytological and histological examination of biopsy material, a CT scan of the chest with contrast vessels of the mediastinum, ultrasound study of the mediastinum, supraclavicular area, abdomen, MRI of the chest were carried out.

Quantitative variables are described by the following statistics: arithmetic mean value, standard deviation of the arithmetic mean, with the median of 25^{th} and 75^{th} percentiles. The significance of differences was determined using the non-parametric Mann-Whitney U-criteria, at the level of error $p < 0,05$. The calculations were performed on a PC using Microsoft Excel application and package statistical analysis Statistica 5.1 for Windows ("StatInc.", USA).

Endocopic surgeries were performed in patients for whom it was unable to establish the diagnosis using complex diagnostic measures (transthoracic puncture under visual control of ultrasound and CT), of these in 31 cases (68.8%), surgery was performed from right side, in 14 (31.2%) with a left side access.

The mean size of punctured nodes in the investigated group of patients was 22±11.5 mm (5-45 mm). We used the classification of mediastinal lymph nodes and lungs proposed by T. Naruke.

The main clinical signs identified: general weakness - in 40 (88.9%) patients, pain of various localization - 17 (37.7%), cough -15 (33.3%), increase of body temperature - 7 (15, 5%), dyspnea - 1 (2.2%), increased sweating - 2 (4.4%), weight loss - 3 (6.6%), pruritus - 4 (8.8%), signs of compression the superior vena cava - 7 (15.5%). More than 64% of cases (29 patients) had different combinations of these manifestations of the disease: general weakness, fatigue - 13 (28.8%), a combination of general weakness with pain - 5 (11.1%); combination of three or more clinical manifestations: general weakness, cough, sweating and difficulty of swelling - 13 (28.8%) patients. Tuberculosis (TB) specialists before diagnostic thoracoscopy counseled all patients, in order to exclude active TB lung process.

In presence of pleurisy and pericarditis - 5 (11.1%), in combination with clinical respiratory failure, before the intervention performed puncture of the pleural cavity and pericardium, followed by cytology.

Videosurgical procedures were conducted by usage of videosurgical standand and instruments of «Karl Storz» (Germany).

Technique of surgical intervention: The patient lays on the healthy side, with separate bronchus intubation. 3, if necessary, 4 trocarsare injectedto the pleural cavity. After the introduction of the 1^{st} trocar CO2 insufflation into the pleural cavity pressure of 6-8 mm Hg is performed. Next, enter the rest of the trocars and endoscopic instruments are inserted from foramen with 2 to 5 mm in diameter.

Trocar locations:

- In the VII intercostal space by the mid-axillary line for the telescope;
- In the V or VI intercostal space on frontal axillar line for tools;
- In the VI intercostal space by posterior axillar line for tools and aspirator.

During the surgery, REVISION pleural cavity and lung was done. The diaphragm, the front and rear surface of the lung were observed for the presence of adhesions, cysts or bullae. In the presence of adhesions in the pleural cavity using scissors and monopolar coagulation separation of adhesions were held, which enabled thorough investigation of the surface of the lung, mediastinum, to clarify the localization, the nature and extent of education, or the conglomerate of lymph nodes. Usually enlarged lymph nodes are located above the root of the lung or in the anterior mediastinum. Mediastinal pleura over the formation of coagulated with mono- or bipolar coagulation, after mobilization of the lymph nodes, two or three lymph nodes were removed in order to make the examinations possible, if the conglomerate nodes or in the presence of signs of sprouting in the mediastinal structures after pre-coagulation for the study took a few pieces of tumor tissue from two or more points. Upon detection of lesions in the parietal or visceral pleura, additional biopsy was performed in areas. Surgery ended with drainage of pleural cavity.

On Fig. 1 step of removing the lymph node with the anterior mediastinum is shown.

Fig. 1. Removing the lymph node from the anterior mediastinum

3. RESULTS AND DISCUSSION

Adequate material for morphological studies were obtained in 100% of cases. We analyzed the accuracy of morphological diagnosis of metastatic mediastinal lymph nodes, depending on the groups studied sites. Groupings of lymph nodes examined is shown in Table 1.

After confirmation of the malignant process, for further special medical treatment, the patients were transferred to the department of chemotherapy, when confirming a tuberculous process - in the TB hospital.

In all interventions performed by VATS deaths weren't observed. Conversions performed in 3 (6.6%) patients. The reason for the conversion in one case was adhesions in the pleural cavity. In 2 (4.4%) patients operation volume was expanded to thoracotomy. The need for conversion in the first case due to bleeding from the wall of the superior vena cava at the time of biopsy, which is associated with the complexities of identifying pathological focus due to changes in topographic and anatomic location of the vessel. In the second case, the conversion is caused due to damaging of the right side wall of the trachea, the endotracheal tube cuff inflated in the middle third of the thoracic trachea, it was considered as an enlarged paratracheal node. A defect in the side wall of the trachea was 0,5-0,7sm, it was stitched by atraumatic sutures (2/0 prolene). All operations have finished successfully. No deaths were observed.

Table 1. Group of examined lymph nodes

Group of lymph nodes	Verification of diagnosis by VATS (*n*)	Sensitivity of VATS, %
2L	4	97%
2R	7	98%
4L	6	100%
4R	9	100%
5	8	98%
6	7	100%
7	4	100%

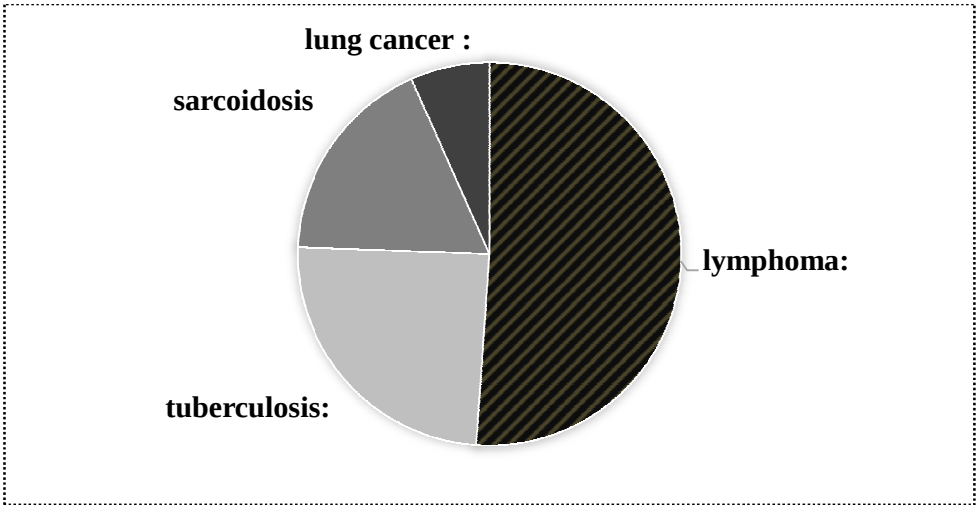

Fig. 2. Results of planned morphological study

The average duration of the operation at the stage of development techniques was 60.9 minutes. With experience, the duration of VATS interventions decreased to 22.9±12,3 min. Due to the smooth course of the postoperative period in the study group, only 3 (6.6%) patients were in the intensive care unit, the remaining patients after extubation were transferred to the department. Narcotic pain medications were not used. Pains had moderate and weak character, were coped with the use of non-narcotic analgesics, and after removal of the drainage tubes it was very weak or absent. The duration of chest tube in the study group ranged from 1 to 3 days (on average 2,1±0,8 days) Duration of postoperative hospital stay in group thoracoscopy was 3 to 7 days (average 3±1,9 days). Active patients recovered within the first days after suffering interference.

4. CONCLUSION

In increasing in the mediastinal lymph nodes, video surgery was performed to clarify the nature of the changes identified through noninvasive instrumental examination, such as x-rays, ultrasound, MDCT, MRI. Videothoracoscopy showed high effectiveness and informative in the diagnosis of lymphoproliferative diseases of the mediastinum. Contraindications to the diagnostic operations are the presence of adhesions in the pleural cavity, severe condition of patients.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Adachi T, Nakahata M, Moritani S, Iida H, Ogawa K. Enlarging mediastinal/hilar lymphadenopathy with calcification. Clin Case Rep. 2015;4(2):212-3.
   DOI: 10.1002/ccr3.451
2. Bramley K, Pisani MA, Murphy TE, Araujo KL, Homer RJ, Puchalski JT. Endobronchial ultrasound-guided cautery-assisted transbronchial forceps biopsies: Safety and sensitivity relative to transbronchial needle aspiration. Ann Thorac Surg. 2016;pii: S0003-4975(15): 01959-1.
   DOI: 10.1016/j.athoracsur.2015.11.051
3. Dreiher J, Kordysh E. Non-Hodgkin lymphoma and pesticide exposure: 25 years of research. Acta Haematol. 2006;116(3):153-64.
4. Hartmeier SH, Steurer J, Christen R, Fehr J, Schleiffenbaum B. Castleman's disease--a rare cause of a febrile state with lymphadenopathy. Dtsch Med Wochenschr. 1997;122(38):141-6.
5. Huggins JT, Doelken P, Sahn SA, King L, Judson MA. Pleural effusions in a series of 181 outpatients with sarcoidosis. Chest. 2006;129:1599–1604.
6. Karunanayake C, Dosman J, Pahwa P. Non-hodgkin's lymphoma and work in agriculture: Results of a two case-control studies in Saskatchewan, Canada. Indian J Occup Environ Med. 2013;17(3):114-21. DOI: 10.4103/0019-5278.130860.
7. Klimenko VN, Punane YA, Arsenyev AI. Videothoracoscopy in the diagnosis and treatment of tumors of the lung, mediastinum and pleura in children and teenagers. Vop. Oncol. 2007;2:215-218.
8. Mangasarova YK, Magomedova AU, Kravchenko SA, Shmakov RG, et al. An eight-year experience in the treatment of aggressive B-large cell lymphoma of the mediastinum. Therapeutic Archives. 2013;(7):Str. 50-56.
9. Naruke T, Suemasu K, Ischikawa S. Lymphnodemapping and curability atvarious levels of metastasis in resected lungcancer. J. Thor. Cardiovasc. Surg. 1978;176:832-839.
10. Nedelcu RE, Kiss E, Ciorba M, Galbenu P, Ulmeanu R. Mediastinal fibrosis and Hodgkin lymphoma mimicking bronchiolitis obliterans organizing pneumonia. Pneumologia. 2015;64(1):40-5.
11. Vorobyov IA, Samoilova RS, Vorobyov AI, et al. Diffuse large cell lymphoma with primary mediastinal lymph node involvement: Diagnosis and treatment. Therapeutic Archives. 2010;7:61-65.
12. Opanasenko MS, Konik BM, Kupchak IM, Kshanovskyi OE, Tereshkovych OV, Stasiv TM, Klymets EV. Application of vioeothoracoscopic procedures in a syndrome of intrathoracic lymphadenopathy of undeteriviined origin. Klin Khir. 2015;10:41-3.

13. Pearce N, McLean D. Agricultural exposures and non-Hodgkin's lymphoma. Scand J Work Environ Health. 2005; 31(Suppl 1):18-25; Discussion 5-7.
14. Sokolov VV, Grishin NA, Trachtenberg AK, Kolbanov KI, et al. Features videothoracoscopy in oncological clinic. Russian Journal of Oncology. 2007;(4): S.7-12.
15. Shulutko EM, Pivnik A, Gotman LN, Matveeva T, et al. Surgical treatment of residual mediastinal tumors and lung in patients with Hodgkin's disease and lymphosarcoma. Russian Journal of Oncology. 2004;(3):Str.24-27.
16. Hyun Jin Park, Jung Im Jung, Myung Hee Chung, Sun Wha Song, Hyo Lim Kim, et al. Typical and atypical manifestations of intrathoracic sarcoidosis. Korean J Radiol. 2009;10(6):623–631.
DOI: 10.3348/kjr.2009.10.6.623
17. Koyama T, Ueda H, Togashi K, Umeoka S, Kataoka M, Nagai S. Radiologic manifestations of sarcoidosis in various organs. Radiographics 2004;24:87-104.
18. Naruke T. Mediastinal lymph node dissection. In: Shields TW (ed) General thoracic surgery, 4th edn. Williams and Wilkins, Baltimore. 1994;469–491.
19. Kalabukha IA, Mayetniy EM. Benign tumors of mediastinum: Clinic, diagnosis, surgical treatment. Klin Khir. 2015;12:33-5.
20. Yaitsky NA, Rusanov A, Agishev A, Kazakov N, et al. Transthoracic biopsy a needle under ultrasound guidance with tumors of the anterior mediastinum. Bulletin im. I.I. Grekova Surgery. 2013;3:S.24-27.
21. Makdisi G, Roden AC, Shen KR. Successful resection of giant mediastinal lipofibroadenoma of the thymus by video-assisted thoracoscopic surgery. Ann Thorac Surg. 2015;100(2):698-700.
DOI: 10.1016/j.athoracsur.2014.09.069
22. Nin CS, de Souza VV, do Amaral RH, Neto RS, Tronco Alves GR, Marchiori E, et al. Thoracic lymphadenopathy in benign diseases: A state of the art review. Respir Med. 2016;112:10-7.
DOI: 10.1016/j.rmed.2016.01.021

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/15330