#### **Contents**

| Subjects  | Page |
|---|------|
| List of abbreviations   | II   |
| List of Figures   | V    |
| List of Tables  | VII  |
| • Introduction  | 1    |
| Aim of the work   | 4    |
| • Review of Literature  |      |
| ♦ Epidemiology  | 6    |
| ◆ Pathogenesis  | 12   |
| ♦ Clinical Presentation   | 17   |
| <ul> <li>Diagnostic and therapeutic role of bronchoscopy</li> </ul> | 27   |
| ♦ Pre procedure preparation   | 37   |
| ◆ Complications and follow up of inhaled                            |      |
| tracheobronchial foreign body                                       | 45   |
| Patients and Methods  | 51   |
| • Results   | 67   |
| • Illustrative Cases  | 104  |
| • Discussion  | 122  |
| • Summary   | 151  |
| • Conclusion  | 157  |
| • Recommendations   | 159  |
| • References  | 161  |
| • Arabic Summary  |      |

#### List of Abbreviations

**BAL** : Bronchoalveolar lavage

**CT** : Computed tomography

**CXR** : Chest radiograph

**ETT** : Endotracheal tube

**FBI** : Foreign body inhalation

**FBs** : Foreign bodies

**FOB** : Fibrooptic bronchoscopy

**GA** : General anesthesia

**IFB** : Inhaled foreign body

**LMA** : Laryngeal mask airway

**NAD** : No abnormalities was detected

**RB** : Rigid bronchoscopy

**TBFBI**: Tracheobronchial foreign body inhalation

**VB** : Virtual bronchoscopy

### List of Figures

| No.       | <u>Figure</u>   | <u>Page</u> |
|-----------|---|-------------|
| 1         | Recommended algorithm for the diagnosis and management of foreign bodies.   | 36          |
| 2         | Pictures of flexible video bronchoscope.  | 60          |
| <u>3</u>  | Bronchoscopic system with optical telescope connected.  | 63          |
| <u>4</u>  | Evidence of FB in tracheobronchial tree by bronchoscopy.  | 70          |
| <u>5</u>  | Displays the number of patients with follow up record.  | 75          |
| <u>6</u>  | Cut-off value of age in relation to risk factors.   | 80          |
| 7         | Cut-off value of time interval in relation to symptoms.   | 83          |
| <u>8</u>  | Chest CT scan showing left lung collapse.   | 104         |
| 9         | FB (wistle) removed by rigid bronchoscopy   | 105         |
| <u>10</u> | Chest CT showing few nodular shadows bilaterally.   | 106         |
| <u>11</u> | Chest X-ray showing left lower lobe collapse and right compensatory hyperinflation.                                     | 107         |
| <u>12</u> | FOB Showing a) seed in left main bronchus surrounded by b) granulation tissue and urine secretions.                     | 108         |
| <u>13</u> | Showing seed removed from left main bronchus (1 cm diameter)  | 108         |
| <u>14</u> | Chest X-ray showing better aireation in left ling but still had left mediastinal shift with compensatory hyperinflation | 108         |
| <u>15</u> | Improvement of the granulation tissue in left main bronchus in the previous site of inhaled                             | 109         |

| No.       | <u>Figure</u>   | Page |
|-----------|---|------|
|           | seed  |      |
| <u>16</u> | a)Chest X-ray, b) Chest CT showing right lower lobe consolidation collapse.   | 110  |
| <u>17</u> | FOB showing corn in bronchus intermedius surrounded with purulent secretions and granulation tissue   | 111  |
| <u>18</u> | FOB showing granulation tissue in bronchus intermedius surrounded with purulent secretions in the site of corn causing airway stenosis                                    | 111  |
| <u>19</u> | Showing fragments of corn removed from bronchus intermedius and remnants of granulation tissue removed by forceps   | 112  |
| <u>20</u> | Chest CT showing right lower lobe bronchiectatic changes  | 112  |
| <u>21</u> | Airway stenosis due to remaining granulation tissue in the site of inhaled corn (black arrow)   | 113  |
| <u>22</u> | Surgically resected right lower lobe due to bronchiectasis  | 114  |
| <u>23</u> | Histopathological examination of the resected lobe showing bronchiectasis, pneumonic process and partial collapse with compensatory emphysema in surrounding lung tissue. | 114  |
| <u>24</u> | Chest X-ray showing better right lung inflation after right lower lobectomy.  | 115  |
| <u>25</u> | Chest X-ray and chest CT showing radio-<br>opaque shadow in right main bronchus<br>extended to bronchus intermedius   | 116  |
| <u>26</u> | FOB a) Foreign body for right main bronchus.  B) granulation tissue in the site of foreign body.  | 117  |

| No.       | <u>Figure</u>  | <u>Page</u> |
|-----------|--|-------------|
| <u>27</u> | A piece of glass removed by rigid bronchoscopy (1×2×3 cm)              | 117         |
| <u>28</u> | FOB showing marked improvement of granulation tissue.                  | 118         |
| <u>29</u> | Chest X-ray showing right paracardiac consolidation.                   | 119         |
| <u>30</u> | FB peanut showing granulation tissue in the site of FB.                | 120         |
| <u>31</u> | Granulation tissue in the site of FB.                                  | 120         |
| <u>32</u> | Fragments of peanut removed by bronchoscopy.                           | 120         |
| <u>33</u> | Chest X-ray showing improved right paracardiac consolidation collapse. | 121         |

#### **List of Tables**

| No.       | <u>Table</u>  | <u>Page</u> |
|-----------|---|-------------|
| 1         | Clinical presentation of foreign body inhalation (FBI)  | 21          |
| <u>2</u>  | Advantages and disadvantages of flexible and rigid bronchoscopy for foreign body removal.         | 33          |
| <u>3</u>  | Potential complications due to foreign body inhalation and its bronchoscopic removal.             | 43          |
| <u>4</u>  | Demographic data, risk factors and history of witnessed inhalation of the studied group.          | 67          |
| <u>5</u>  | The clinical manifestation of the studied group and the duration of the time before presentation. | 68          |
| <u>6</u>  | Radiological findings among the studied group.  | 69          |
| <u>7</u>  | Evidence of FB in tracheobronchial tree by bronchoscopy.  | 70          |
| <u>8</u>  | Site, type of inhaled FB as identified by bronchoscopy among studied groups.                      | 71          |
| 9         | Complications of inhaled FB on tracheobronchial tree.   | 72          |
| <u>10</u> | Descriptive analysis of the bronchoscopic procedure.  | 73          |
| <u>11</u> | Medications received during and post procedure by the patients.                                   | 74          |
| <u>12</u> | Number and percentage of the patients who followed up.  | 75          |
| <u>13</u> | Patients compliance to the follow up setting.   | 75          |
| 14        | Descriptive follow up data (Clinical and Radiological) of the studied patients.                   | 76          |
| <u>15</u> | The different needs for follow up rebronchoscope among the studied patients.                      | 77          |
| <u>16</u> | Types of the inhaled foreign bodies in relation to the different age groups.                      | 78          |

| No.       | <u>Table</u>  | Page |
|-----------|---|------|
| <u>17</u> | Types of the inhaled foreign bodies in relation to the gender of the study group.                       | 79   |
| <u>18</u> | Cut-off value of age in relation to risk factors.   | 80   |
| <u>19</u> | Number of patients younger and older than 3 years.  | 81   |
| <u>20</u> | Comparison between risk factors and age of patient according to the type of inhaled Foreign body (IFB). | 82   |
| <u>21</u> | Comparison between the variable risk factors with the age of the patients and the type of IFB.          | 82   |
| <u>22</u> | Cut off value of time interval.   | 83   |
| <u>23</u> | Number of the patients presented before and after 3 weeks.  | 83   |
| <u>24</u> | Comparison between time interval and symptoms of IFB.   | 84   |
| <u>25</u> | Comparison between time interval* and signs / clinical findings.  | 85   |
| <u>26</u> | Comparison between time interval and complications of IFB on tracheobronchial tree.                     | 86   |
| <u>27</u> | Comparison between time interval* and variable Complications of IFB.                                    | 87   |
| <u>28</u> | Comparison between time interval and the types of IFB (organic and inorganic).                          | 88   |
| <u>29</u> | Comparison between the bronchoscopic site of IFB and age, gender and type of IFB.                       | 89   |
| <u>30</u> | Comparison between radiological site of the IFB and bronchoscopic site of the IFB.                      | 90   |
| <u>31</u> | Comparison between site of IFB bronchoscopically and duration of the procedure.                         | 91   |

| No.       | <u>Table</u>   | <u>Page</u> |
|-----------|--|-------------|
| <u>32</u> | Comparison between site of IFB as assessed bronchoscopically and complication of both the IFB and the procedure. | 92          |
| <u>33</u> | Comparison between types of IFB and age, gender and risk factors.  | 93          |
| <u>34</u> | Comparison between type of IFB and duration of bronchoscopic procedure.  | 94          |
| <u>35</u> | Comparison between type of IFB and complications of FB on tracheobronchial tree.                                 | 95          |
| <u>36</u> | Comparison between complications of the IFB and age of the patient.  | 96          |
| <u>37</u> | Comparison between complications of the bronchoscopic procedure and complications of IFB.                        | 97          |
| <u>38</u> | Impact of the presence of complications of IFB on the complications of the procedure.                            | 98          |
| <u>39</u> | Comparison between complications of IFB on tracheobronchial tree and duration of the procedure.                  | 99          |
| <u>40</u> | Comparison between duration of follow up (month) and gender, age, and type of IFB.                               | 100         |
| <u>41</u> | Comparison between Radiological follow up and duration of follow up.   | 101         |
| <u>42</u> | Comparison between bronchoscopical follow up and duration of the follow up.                                      | 102         |
| <u>43</u> | Comparison between time interval (weeks) and duration of months follow up.                                       | 103         |
| <u>44</u> | Comparison between complications of IFB and duration of the follow up.   | 103         |



# Introduction





## Aim of the Work





### **Review of Literature**





### **Patients and Methods**





# Results





## **Illustrative Cases**





## Discussion

