A PERSPECTIVE SURVEY ON SPINAL TUBERCULOSIS DISEASE PREDICTION USING MACHINE LEARNING

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Abstract

T.B. is one of the most prevalent diseases in the world. T.B. affects the spinal cord of human beings. The World Health Organization (WHO) has been working to prevent the disease's spread since 2015. Once T.B. is diagnosed, care is taken to eliminate the disease with proper treatment and care. In the medical field, there are a lot of methods available for diagnosing T.B. However, detecting spinal T.B. in the early stages is very difficult using existing algorithms.This review focuses on the risk factors for spinal T.B., essential symptoms, image-assisted diagnoses.

Keywords: Tuberculosis, Computed topography, Magnetic resonance, MRC

I. INTRODUCTION

The first classical description of T.B. was given by Percival Pot in 1778. Its primary treatment was to ensure that the bed rest, fresh air, and better nutrition in the early days. Spinal Tuberculosis is a severe disease that can cause discitis-osteomyelitis. The classic myth is that the disease will spare the intervertebral discs. The disease is sporadic in many countries but has increased in some other countries. Surgery is adjunctive and controversial. To diagnose the level of damage caused by Tuberculosis to the spine, MRI and C.T. scan images are used mainly by Physicians in the world.

II. RELEVENT WORKS ON SPINAL TUBERCULOSIS

In [1], W Y Cheung et al.,2011 stated that Tuberculosis's

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main reason is mycobacterium complex bacillus. He classified that 60 germs fall into this category. Only a few of them cause disease. Affecting the spine is included in the secondary stage. Its symptoms can be extensive. The germs destroy that part of the cell by destroying it. The bony destruction of the anterior elements is fragmentary in 47% of the cases; osteolytic in 34%, subperiosteal in 30% cases, and localized destruction with sclerotic margins in 10%.

In [2], Robert Dunna et al.,2015 demonstrated that imaging of the back pain with suspicion for Tuberculosis should begin with standard A.P. and lateral spine radiographs using advanced imaging modalities clinically warranted.

In[3], Krishnan Khanna and Sanjeev Sabharwal,2019 demonstrated that Spine radiographs are often enough to diagnose the disease and form the cornerstone of diagnostics resource-poor, endemic regions. They clarified that Spinal Tuberculosis has a characteristic of reducing bone density in the anterior spine and lytic lesions involve the vertebral body and paradisical margins.

In[4], Krishn Khanna,2018 demonstrated that typical clinical features axial pain, constitutional symptoms, kyphosis, absees, and neurological deficits cause T.B. in most human beings. He recommended that two months of dosage of rifampin, isoniazid, pyrazinamide, and ethambutol followed by four months of continuation therapy of rifampin and isoniazid would drive away T.B. disease. The pinnacle of spinal T.B. medical management is to reduce the patient's infection. They are preventing the risk of deformity in the patient with neurological problems. They suggested that proper treatment would prevent the recurrence of T.B. and

medicine needs to be given according to the severity of the disease. Each month, medical imaging can be used to diagnose the condition. Medication for children as well as adults may vary in dosage. Consecutive bed rest will be of great benefit. Small hand and foot movements are good, as well as foods that boost the immune system.

In [5], Bhumika Vaishnava et al.,2019 stated that Streptomycin was the first antimicrobial therapy. It came about in 1943. The study of this drug's efficacy in 1947 by the Medical Research Council(MRC) of the United Kingdom is often cited as the first randomized control trial and cemented the role of antimicrobial therapies for this disease[6].

In [7], Richard Bostelmann et al., 2016 stated that four antibiotics, isoniazid, rifampin, pyrazinamide, and ethambutol, need to be used for spine tuberculosis. Protein and vitamin diets have been shown to improve in many patients. Only 6% of patients needed spine surgery during that period.

In [8], Yu-Hung Chen et al.,2013 demonstrated that there had been significant progress in diagnosis and treatment over the past 50 years. In most cases, the health benefits are that the disease is cured without the need for surgery.

In [9], W.Y. Cheung and Keith D K Luk, 2011 researched the diagnostic advances in the availability of advanced imaging and polymerase chain reaction and introduced the rapid therapies for curing T.B.

In[10], In GwunJang and Il Yong Kim,2010 analysed the hundreds of patients who got affected by lumbar spine due to Tuberculosis. They found out that disc degeneration is the main reason for lumbar spine disease. They introduced a numerical framework to treat tuberculosis patients who got affected by lumbar spine diseases

In [11], MyngSang-Moon et al., 2013 found that more research work needed to be done in understanding the future of this disease, they stated that 90% of all spinal T.B. treatments have a positive result[12].

In [13], Aman Bansal et al., 2019 demonstrated that diagnosis through medical imaging helps detect treatment early.

III. CONCLUSION

This paper reviews various researches undergone in the field of detecting and curing Spinal Tuberculosis. Spinal T.B. is common in some countries despite early detection and proper management. Medical Image processing methods help in detecting T.B. very early by using automated scanning software. T.B. specialists or bone specialists can easily classify spinal T.B. diseases from the extracted images. We reviewed the various research works done by famous spinal surgeons for detecting and curing Spinal Tuberculosis disease. We plan to propose medical image processing methods using Deep learning techniques for detecting Spinal T.B. in early stage.

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