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Distinguishing Essential Tremor from Dystonic Tremor-Archimedean Spiral Drawing

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ABSTRACT:
Tremor may be one of the core manifestations of various Neurological diseases. Its pattern helps in distinguishing some diseases. Analysis of spiral hand drawing may be helpful in distinguishing Essential tremor (ET) from Dystonic tremor (DT). We analyzed hand drawn spiral axis of 108 patients among which 84 are ET cases and 24 are DT cases. We found 64.29% (54/84)single tremor orientation axis in ET cases and predominantly no clear axis seen in DT cases. Multiple tremor orientation axis in spiral drawing is seen more in ET cases.

Key Words: DT vs ET, Archimedean Spiral Drawing

I. INTRODUCTION:

The human tremor is a common neurological disorder[1]. Various types of tremor (rest, action –postural, intention) can be seen in different Neurological diseases like Essential tremor (ET), Parkinson's disease, Dystonic tremor (DT) etc. Details history, clinical examination, specific signs help in distinguishing different diseases with tremor. Pattern of tremor is different in various Neurological diseases. Drawing in patients with tremor reveals the presence of oscillatory errors that vary in frequency and amplitude. Tremor has been found to be consistently worse in unsupported spiral drawing that dependant on the severity of tremor and generally have a tremor orientation axis[2]. Hand-drawing patterns are commonly assessed by means of visual rating scales. In clinical settings, the differentiation of essential tremor and dystonic tremor may be very challenging. Archimedean spiral drawing may be a very useful screening tool to distinguish ET cases from DT cases.

Aims and Objectives:
The aims and objectives of this study was to analyze spiral drawing feature of patients with ET and DT.

II. MATERIALS & METHODS:

Data collected from patients proforma stored in the movement disorder clinic, BIN, IPGMER Kolkata. We analyzed hand-drawn Archimedean spirals of total 108 patients of DT and ET.

Each of the Archimedean spirals was assessed for the presence of an oscillation error; if present, then assessed for single identifiable clear tremor orientation axis, direction of axis, oscillation error without clear axis and multiple tremor orientation axis(figure-1 & 2) and analyzed the association between the tremor axis and the diagnosis.

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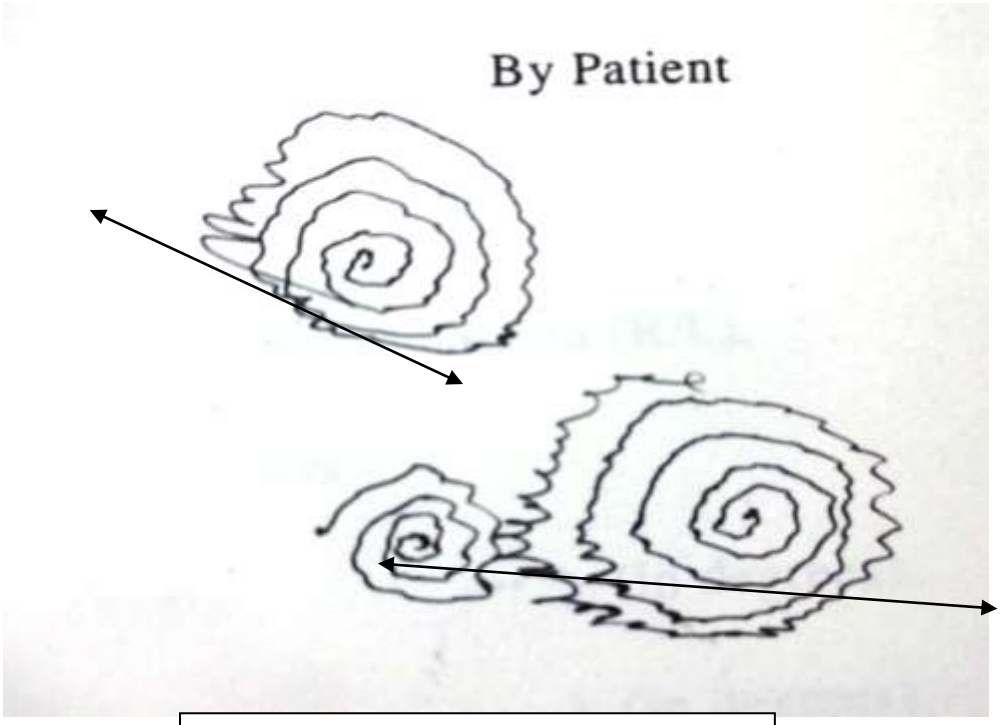

Figure 1: Single axis

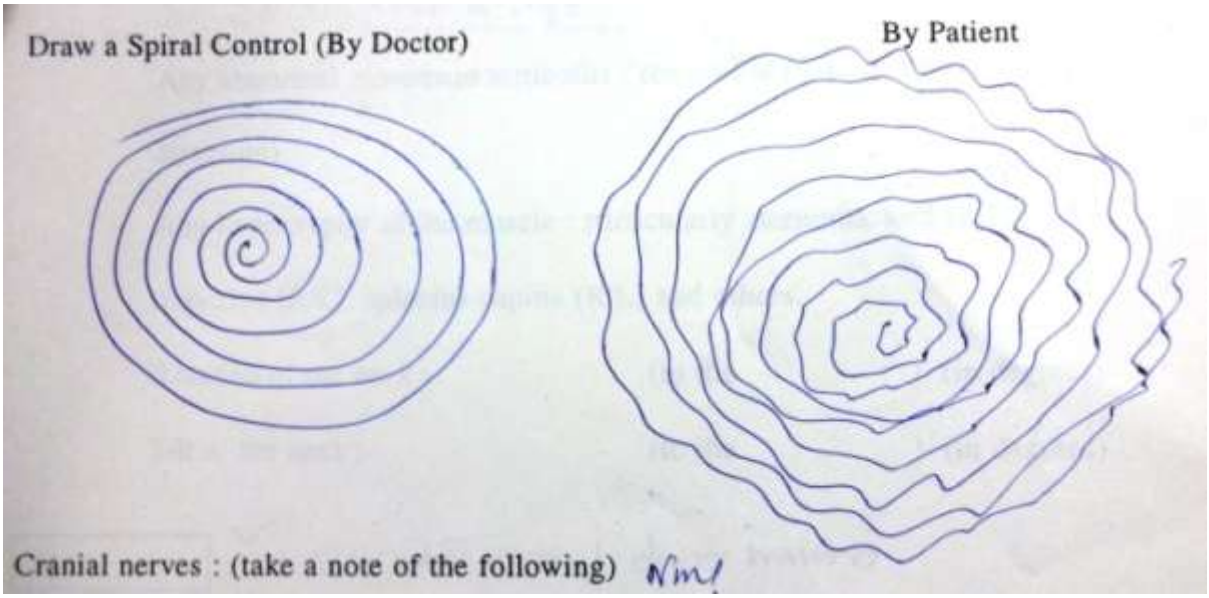

Figure 2: Multiple axis

III. RESULTS AND ANALYSIS:

There were 84 ET cases and 24 DT cases (cervical dystonia13, generalized dystonia 2, hand dystonia 6, multifocal dystonia 3). Identifiable tremor orientation axis (figure 3) seen in ET cases-single axis in 64.29% (54/84), multiple axis in 23.81% (20/84) and no clear axis in 11.90% (10/84) cases whereas in DT cases-single axis in 29.17% (7/24), multiple axis in 33.33% (8/24) and no clear axis in 37.5% (9/24) cases.

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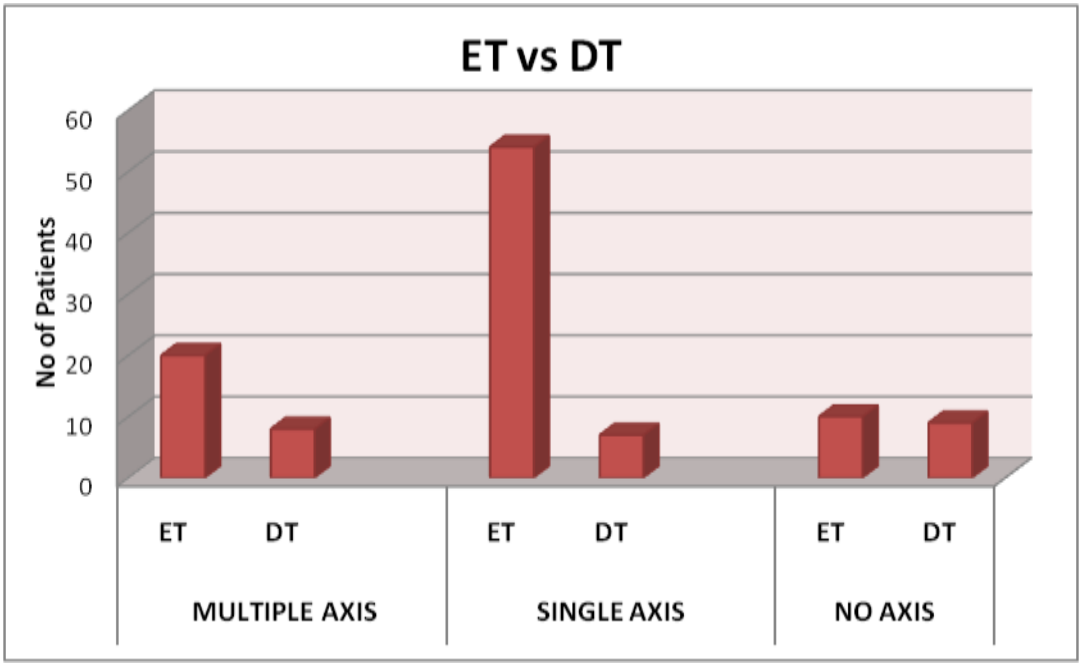

Figure -3: Single identifiable clear tremor orientation axis was seen more in ET casesthan DT case and it is statistically significant (P= 0.0022). Multiple identifiable tremor orientation axis was seen more in DT cases but it is not statistically significant (P=0.3477). In DT cases mostly there was no clear tremor orientation axis.

IV. DISCUSSION:

In our study handwritten spirals appear to have a predominant single axis in ET than DT cases where as no clear axis seen mostly DT cases. Many patients having a diagnosis of "ET" actually have another neurological disorder. Studies show that in clinical practice settings 30 – 50% of ET cases are mis-diagnosed. One previous study on misdiagnosis of tremor disorders reported that of the 26 patients with false ET, 6 (23.1%) were diagnosed with dystonia. Another study of the over-diagnosis of ET demonstrated that 4 (40%) of 10 ET patients had dystonia. These studies reported that these false ET were actually Parkinson disease, dystonia where multiple tremor axis predominantly seen. The presence of a single tremor orientation axis would be one clinical feature that would make the ET diagnosis more likely.

V. CONCLUSION:

The evaluation of Archimedean spirals axis has moderate diagnostic validity as a screening tool to distinguish ET cases from those with DT. Spiral drawing is safe, inexpensive, fast, portable, non invasive and can be administered to a large cohort of patients without instruments.This screening tool is not meant to replace in-person evaluations, but rather, to serve as a screening method to save time and resources.

Limitation:

The study had limitations.

1. Spirals drawn on paper, a computerized spiral analysis is more precise.
2. Small number of cases.
3. Follow up study to exclude misdiagnosis not done

Acknowledgments

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