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RESEARCH ARTICLE

Quantifying Vagal Upload Time to measure recovery from COVID: A Primary Care Observational Study

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ABSTRACT

At Roseville Wellness Group, a Sydney holistic health care centre, 23 post-Covid patients who presented with persistent post infective symptomatology were identified. They all received primary treatment with auricular management using an Evo Premio Laser and secondary support treatment with body acupuncture dependent on the findings at the auricle at that time point. The vascular autonomic signal which is a physiological phenomenon locating dysfunction and distress for the brain and body was used at the auricle to locate vagal dysfunction and subsequent correction. Baseline Vagal Upload Times were measured in 23 post-COVID patients to assess the functional status of their Liver, Lungs, Kidneys and Spleen. Access was via the auricular branch of the vagus located at the concha. The patients were treated weekly and their Vagal Upload Times recorded. Recovery from COVID was associated with a reduction in upload time which decreased over the occasions of measurement for all participants and significant decreases were recorded from the start of treatment to the final session. Patients described improved ability to function, clearing of their brain fog, reduction in their chronic cough and also resolution of their vertigo or balance issues when the upload time reduced to less than 20 seconds per auricular point.

Introduction

The Covid 19 pandemic has opened a Pandora's box of symptomatology from Covid involving multi-system dysfunction or pathology. The most commonly reported symptoms are debilitating fatigue, brain fog, shortness of breath or chronic cough, post -exertional fatigue or delayed recovery from exercise with heart rate changes, anxiety and balance problems or vertigo. The symptoms are suggestive of disruption in the functional connectivity of the brain (brain fog) as well as vagal dysregulation[1-3]. There appears to be a gender bias with women 4 x more likely to be badly affected by Covid [4]. The focus has been on chronic persistent inflammation affecting multiple organs. Covid appears to also cause Arterio-venous shunting hence bypassing essential microcirculation resulting in microcirculatory ischaemia (for example, the brain) and regional cellular compromise of areas involved [5]. The ability to quantify the baseline severity of vagal dysregulation and to track the change in severity (reducing measures) with recovery is achievable. Collecting data in this way may be helpful towards predicting the disease course or recovery time in future cases. Firstly, the therapeutic laser or low level laser [6] has to be used and secondly the Vasculo-Autonomic-Signal or VAS is required. Vagal access can be from the concha of the auricle as it is innervated by the auricular branch of the Vagus nerve [7-10]. The VAS is a physiological phenomenon which can be detected at the radial pulse. It was first described by Dr Paul Nogier in the 1960s [11] and it is most helpful in locating disruption in normal physiological processing, for example by trauma or in Covid patients' cases by the infection itself [12]. Nogier also described the 7 different wavelength / frequency groupings referred to as the Nogier frequencies A to G which target rehabilitation of ectodermal, mesodermal and endodermal tissue correspondences at the auricle. From the concha of the ear there are also correspondences or reflex zones for the Liver (LR), the Lungs (LU), the Kidney (represented by the correspondence for BL 23 – in Traditional Chinese Medicine (TCM) it is important for treating Kidney)[13-14]. This has been selected as it is important to be consistent in applying laser to the endodermal derived concha. (The other KI correspondence is at mesodermal derived region of the auricle). The concha also has correspondences for Spleen (SP).

In TCM, LR is essential for daily energy, good sleep drop off, and both skeletal and smooth muscle function. LU is obviously for respiratory regulation and has some links to microcirculation in TCM (via LU9 body acupuncture point). KI is essential not just for the genitourinary systems but is essential for optimal function of the brain and other Central Nervous System (CNS), the Peripheral Nervous System (PNS), the adrenals [15].

It has been successfully demonstrated reducing laser upload times at the auricle correlated with improvement in stress, anxiety and depression scores. In the same study, therapeutic laser intervention also helped reduce back pain with relevant changes in laser dosage [16]. In this cohort of patients the aim is to record baseline upload times for the laser energy transfer- or laser dosage-which can be referred to as Vagal Upload Time (VUT) and the subsequent VUTs with each treatment session.

Methods

PARTICIPANTS

Women: 20

Men: 3

THE VASCULOAUTONOMIC SIGNAL (VAS) AND HOW TO LOCATE IT

Traditionally the clinician sits at the head of the bed with the patient lying down in front of the clinician on the treatment bed. He or she uses his or her thumb to identify the increased radial pulse amplitude where there is an active (dysfunctional) site requiring treatment and restoration to optimal function [17-18]. At RWG, the technique has been adapted so the clinician sits or stands to the right hand side of the patient on the treatment bed, chooses the best 1-2 finger palpation of the distal phalanges placed lightly on the radial pulse to detect the increased amplitude of the radial pulse. The amplitude of the radial pulse decreases when the vagal upload is complete. The time from laser onset to this signal is the VUT, which is a measure of vagal status. Empirically 15 sec or less is observed when the patient is well. Since the Covid pandemic it has been noted the best possible upload time is slightly longer- at 20sec or less.

THE LASER

The ergonomic hand-held Premio EVO (PL) therapeutic laser delivers infra-red 905nm 100W superpulsed biostimulation at 5J/min. It has the capability to deliver the Nogier frequencies A, B, C, D E, F and G. At the concha the VAS helps locate LR, LU, KI, SP. At the start of laser activation, the duration of stimulation is counted in seconds and as the VAS resolves (resumes normal pulse amplitude) the laser activation is stopped. This duration of laser energy transfer is measured, for ease of calculation, as the Vagal Upload Time (VUT). The Nogier frequency B is used for the conchal endodermal biostimulation. Empirically 15 sec or less is observed when the patient is well.

PROTOCOL

Primary- Auricular Procedure

At each session the patients were treated with auricular laser first to quantify their vagal status. The concha of the both ears are endodermal correspondences and with the VAS the correspondences for Liver (LR), Lung (LU), Kidney (via mid Lumbar Vertebra (LV) correspondence for BL23 – tonification Kidney Yang in Traditional Chinese Medicine), Spleen (SP) were located and treated. The more commonly used Kidney correspondence is at mesodermal part of the auricle. For consistency of endodermal stimulation, the LV location was used. [Figure 1]

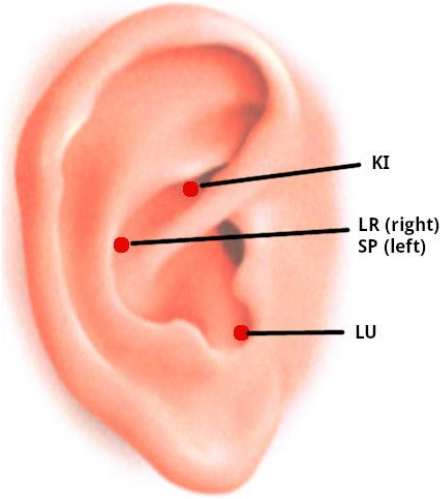

Figure 1: Acupuncture points used in treatment

The patients attended the health centre for two to six treatment sessions. At each session, VUTs were recorded for the sites described above. Some missing values were recorded for three patients. These cases were omitted from the full analyses below, excepting the Liver only analysis in which all 23 were included.

Secondary- Supportive Body Acupuncture

Dependent on the VUT at auricles

If LR is the highest VUT : LI11, LR14, LR8, KI10

IF LU is the highest VUT: LU7 KI6 LI11 or LU9 SP3 SP9

If KI is the highest VUT: CV6 CV4 KI3 KI7 or LU7 KI6 LI11

If SP is the highest VUT: CV6 CV4 ST36 SP6 or SP4 PC6.

Body acupuncture point selection is dependent on the acupuncture points being positive to VAS and after the auricular VUT has identified the organ system most in need of support and rehabilitation. These 4 organs were chosen for their correlation to energy supply, respiratory function, nervous systems function, sleep regulation, blood circulation and immune regulation in TCM.

ANALYSIS

Measurements were transcribed into an electronic format suitable for analysis. A program written in the R language [19] allowed the aggregation and display of the vagal upload times. As the number of measurement occasions varied, the occasions of clinical interest were defined as:

Start of treatment

Measurement(s) during treatment

End of treatment

In cases where only two measurement occasions occurred, the initial measurement values were used as the "during treatment" values.

Having aggregated the raw measurement values, the Start, During and End blocks were entered into a linear regression and the means of each occasion plotted using the plotrix package [20]. As five comparisons were made, the Bonferroni-adjusted significance level of $p < 0.01$ was used.

Results

VUT decreased for participants over the occasions of measurement. For some patients, the decreases for each series were more linear than others [Figure 2]. The overall scores and those for each organ showed a significant decrease ($p < 0.001$) over the three occasions of clinical interest [Start, During, End]. [Table 1] [Figure 3]. Liver VUT was recorded for all patients. A significant decline in VUT was observed ($F [2,66] = 18.05$, $p < 0.001$). [Figure 4].

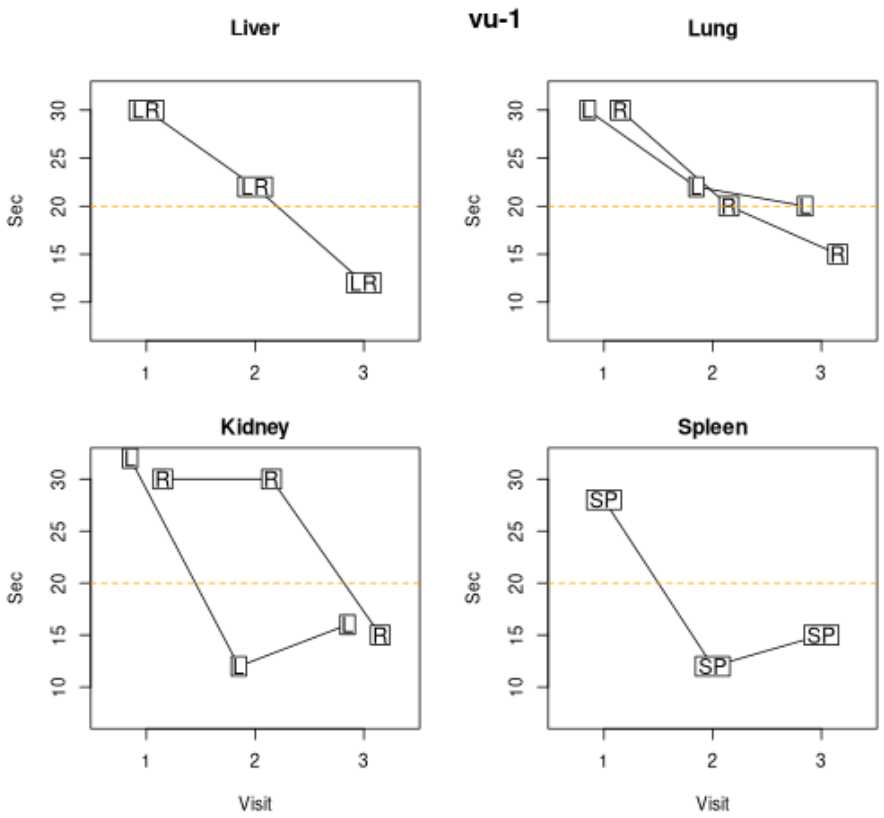

Figure 2: Start, During and End observations for one participant.

Table 1 - Mean scores and significance of linear decrease for VUT.

Organ	Start	During	End	Significance
Liver	39.53	24.92	18.53	$F[2,54] = 13.8$, $p < 0.001$
Lungs	35.55	24.62	16.63	$F[2,111] = 32.4$, $p < 0.001$
Kidneys	28.05	20.37	14.66	$F[2,111] = 29.3$, $p < 0.001$
Spleen	21.21	13.95	12.84	$F[2,54] = 8.6$, $p < 0.001$
All	31.32	21.48	15.66	$F[2,339] = 67.8$, $p < 0.001$

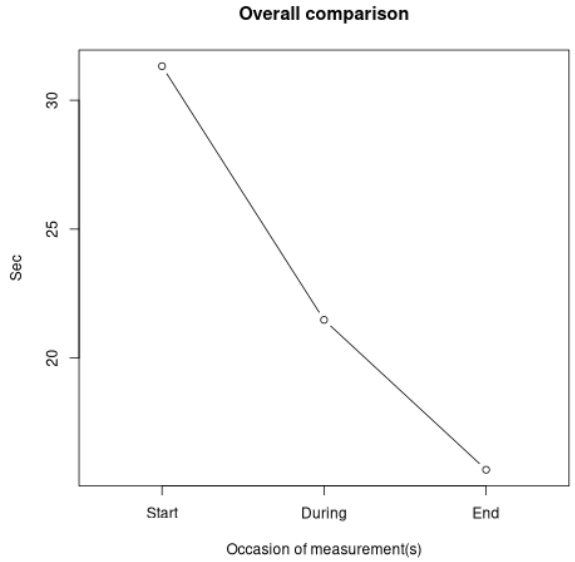

Figure 3. Overall Mean VUT across treatment

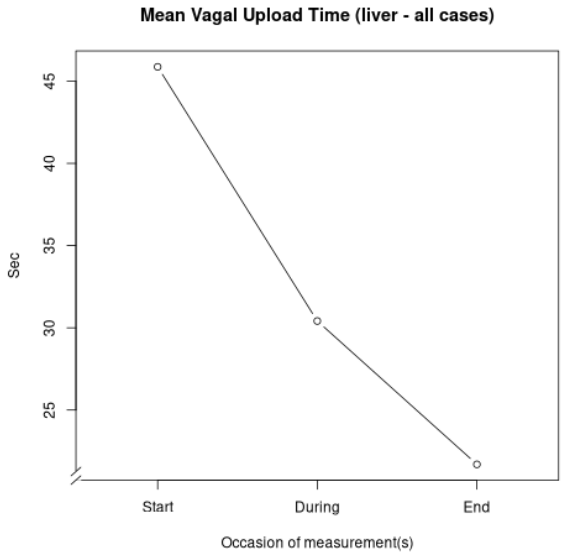

Figure 4. LR VUT only across treatment

Discussion

This is a retrospective primary care observational study to check if quantification of therapeutic laser upload time (VUT) during patient treatment did help in Covid recovery and can in the future assist in predicting recovery. As such, the data was collected for each patient has they presented for treatment. At treatment time the aim was to target any less than optimal function as measured at the auricle and to get the patients better as soon as possible. The patients are familiar with, and expect a combination of firstly, auricular intervention and secondly, body acupuncture -which has been the RWG strategy of care for over 10 years. Twenty three patients who were diagnosed with COVID over the previous 6-18 months presented for the management of their persistent post- Covid symptoms. Their most common complaints being fatigue, brain fog, persistent cough, vagal dysregulation (heart rate change, vertigo or imbalance, sleep changes): Fatigue > vagal dysregulation > brain fog > chronic cough. The VUT was negatively correlated to recovery. The VAS was integral in locating the optimal sites for treatment of the LR, LU, KI and SP in the vagal derived auricular conchae. Auricular therapeutic laser together with VAS had the advantage of identifying the organ systems most in need of rescue or rehabilitation. The added quantification of the severity of the organ dysfunction with the VUT measures helped the clinician to prioritise management. Together, the VUT and VasculoAutonomic Signal (VAS) were integral in secondary body acupuncture point selection.

The LR location mid concha at right ear was used and will continue to be used as the main marker of vagal dysregulation and rehabilitation as it was consistently active with VAS in all patients. The most important advantage of this protocol was the ability to quantify vagal dysfunction and subsequent recovery with treatment by using the VAS. The protocol was user friendly with access at the primary care level with potential to reduce the health dollar costs from Covid. Current research into designing a smartphone application to locate and utilise the VAS, once translated into commercial availability, will make it even easier to apply the VAS in clinical care [21]. It has been mentioned above that the best possible VUT (recovery) since the pandemic is empirically slightly longer in duration (up from 15 seconds to 20 seconds). This could be from the prolonged stress and duress of pandemic conditions, the social isolation from lockdowns or even Covid itself affecting the Vagal Systems. This observational work has many limitations: the cohort is small, there is gender imbalance with 20 women and 3 men studied. This is not a randomised controlled study and there are no formal measures (for example: a relevant Fatigue Score, a measure of vagal functionality, a Sleep Score). Even with all these limitations, the results are promising. Future studies are very much worthwhile where the baseline VUT can be used as a predictor of recovery time from Covid.

Conclusion

Covid patients receiving auricular therapeutic laser for the treatment of vagal dysfunction demonstrated significant decrease in Vagal Upload Time (VUT) ($p < 0.001$) towards recovery. The VUT shows promise as a predictor of vagal systems recovery from Covid.

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Conflicts of interest

The author states that no conflicts of interest occurred.

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