Vitamin D and Burns: A review of the literature and protocols

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INTRODUCTION

Vitamin D has pleotropic effects ranging from musculoskeletal health and immunomodulatory.

An estimated 31% of adults in Australia have inadequate vitamin D status (serum 25-hydroxyvitamin D [25-OHD] level < 50 nmol/L), increasing to more than 50% in women during winter–spring and in people residing in southern states [1]. Low serum 25(OH)D levels has shown a significant association with the magnitude of the critical illness and systemic inflammatory response syndrome (SIRS). Burns patient may be at higher risk of vitamin D deficiency due to altered vitamin D physiology and reduced sunlight exposure (prolonged hospitalisation, dressings and UV protected compressive garments).

There is insufficient literature on the role of Vitamin D in thermal injuries. Some studies show that low vitamin D levels in patients with minor burns, median TBSA of 5%, have been associated with increased length of hospital stay [2]. A retrospective audit was conducted from 2017 – 2019 on the incidence of vitamin D deficiency in burn admitted patients at Concord Hospital.

Burn Injury:
- Bleeding
- SIRS
- Leakage of albumin and VDBP
- Fluid shifts
- Predisposing factors (Age, medical history, season, ethnic group)

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Acute illness:
- Fluid resuscitation
- Decreased intake and absorption
- Limited sunlight exposure
- Surgery (bleeding)
- Limited mobilisation
- SIRS

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Long term management:
- Poor dietary intake
- **Altered Vit D** physiology in scars
- Limited sunlight exposure

Results:

- Previous studies at Concord showed that for major burns only 24% of patients had Vitamin D levels tested from 2011 – 2015.
- Our review of admitted inpatients showed that 30% had vitamin D levels reported from 2017 – 2019. Of those who had vitamin D levels checked, 66% were deficient.
- Patients had a combination of supplemental multivitamin, Vitamin D or oral supplements in combination potentially before, during and / or after the assay.
- The timing of the measures of Vitamin D was inconsistent across admission of patients.

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Implications of Vitamin D

There is suggestion that vitamin D may improve wound healing and prevent infections [3,4].

A meta-analysis reported no improvement on outcomes in critically ill patients supplemented with vitamin D [5]. However, studies did not specifically examine the role of vitamin D in burns patients. The Rousseau study is the only thermal burn injury study with Vitamin D that has shown improved muscle recovery and strength in burn patients supplemented with vitamin D and implied that vitamin D supplementation had positive effects on muscle health and may play a role during rehabilitation [6].

Our data set indicates that there may be a high rate of vitamin D deficiency amongst burns patient. More regular testing is recommended to address vitamin deficiency with possible benefits. Due to potential confounders, we cannot provide any relationship or association. The next stage of this retrospective and prospective study will show the strength of clinical association in pain control and length of stay with vitamin D status.

Future study:

- To assess the relationship between Vitamin D status and pain control for minor and major burns.
- Implementation of assessing Vitamin D in burn patients.
- To investigate the potential interactions of Vitamin D, pain management and length of stay.