



Efficacy of Combined Subanesthetic Ketamine Infusion and Cervical Sympathetic Blockade as a Symptomatic Treatment of PTSD/TBI in a Special Forces Patient with a 1-year follow-up: A case report

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Introduction

- Co-occurrence of posttraumatic stress disorder (PTSD) and traumatic brain injury (TBI) symptoms are particularly prevalent in the special operations forces' community, along with other related conditions (e.g., endocrine dysregulation, sleep disorders, chronic pain).
- Ketamine infusion (KI) has been shown to increase neuroplasticity as well as memory improvement and cervical sympathetic block (CSB) has been shown to improve cognitive function, reduce sympathetic overactivity, and improve other symptoms of PTSD.
- We postulated KI and CSB would have a synergistic effect.

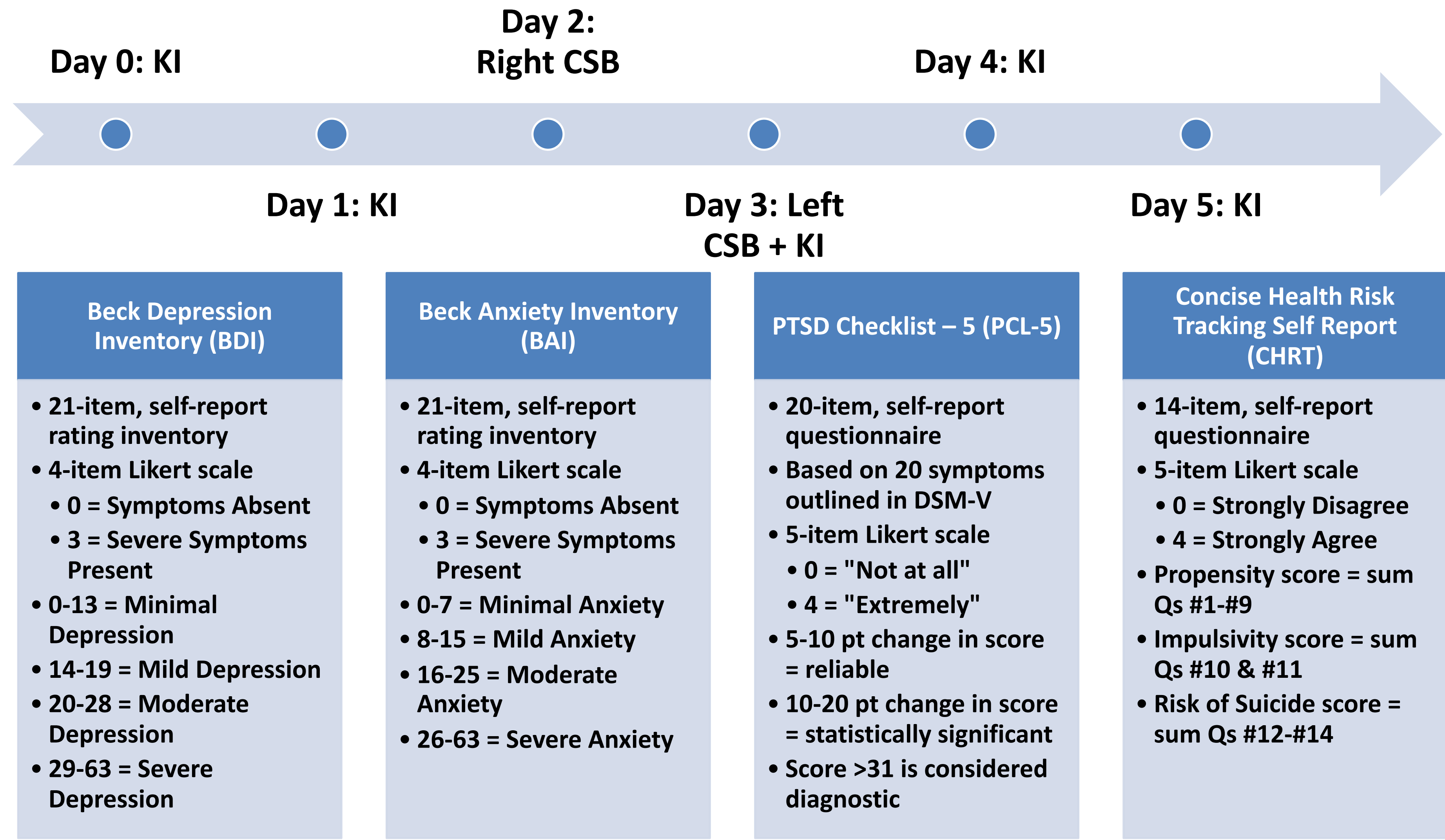
Case Description

- The patient was a 40-year-old male who completed 5 combat deployments to Afghanistan from 2004-2014 (37 months of total deployment).
- He attempted suicide in 1992, 2016 and 2019.
- History of alcohol abuse from 1999-2019.
- History of tramadol, oxycodone, and nalbuphine abuse from 2011-2014
- Patient was misdiagnosed with bipolar disorder between 1996-2019
- His symptoms were refractory to psychotherapy, EMDR therapy, inpatient rehabilitation, and pharmacotherapy (fluoxetine, bupropion).
- Patient was officially diagnosed with PTSD with comorbid TBI in 2019.

Methods

- Patient was treated with a single intervention consisting of bilateral CSB technique with subanesthetic KI X5 and evaluated during treatment and at 1-year follow-up.
- Patient received KI starting at 0.5 mg/kg, which was escalated daily.
- KI was combined with right-sided ultrasound-guided CSB (C6 and C4 levels).
- The next day left-sided CSB and KI were administered.
- PTSD symptoms were evaluated via the following:
 - Posttraumatic Stress Disorder Checklist (PCL-5)
 - Beck Depression Inventory (BDI)
 - Beck Anxiety Inventory (BAI)
 - Concise Health Risk Tracking Self Report (CHRT).
- All measures were assessed prior to treatment, during treatment, and 394 days after.

Treatment Timeline



Procedure Description

Ketamine Infusion (KI)

- Initial infusion of racemic ketamine hydrochloride (0.5mg/kg) administered over 45 minutes
- Premedication with 4 mg IV Ondansetron
- Vital signs & clinical status recorded every 5 minutes
- Patient was monitored by nursing staff for 1 hour post-KI
- Subsequent infusions had ketamine dose increased by 0.1-0.2 mg/kg, titrated to induce mild to moderate dissociation

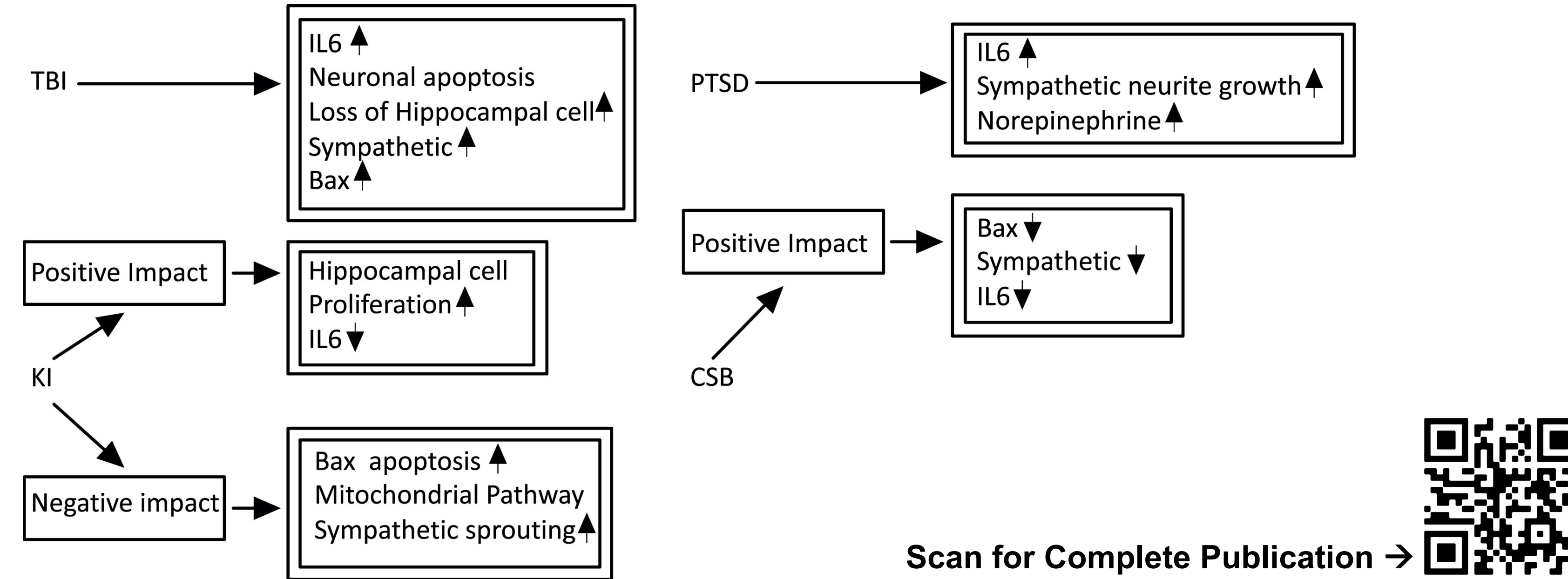
Cervical Sympathetic Block (CSB)

- Ultrasound guidance to approach C4-C6 levels via broadband linear transducer
- Injection site locally anesthetized with 1.5 mL of 1% lidocaine
- In-plane approach, under real-time ultrasound guidance, with 22-gauge echogenic needle placed dorsal to ventral fascia of longus colli, and medial to longus capitis muscles, respectively
- Attempted aspiration, followed by injection of 0.5 mL of 0.5% bupivacaine
- Patient observed for 30 seconds, then 4 mL of 0.5% bupivacaine injected
- Patient observed for additional 30 seconds, additional 4 mL of 0.5% bupivacaine injected
- Repeated at C4 level with 4 mL of 0.5% bupivacaine administered over 2 injections (12.5 mL total)

Table 1: Survey Data

Day	0	1	2	3	4	5	394	% Reduction	Point Reduction
Procedure(s)	KI	KI	RCSB	LCSB + KI*	KI	KI			
BDI (Depression)	31				3		2	96.77%	29
BAI (Anxiety)	15				1		2	93.33%	13
PCL-5 (PTSD)	42						11	73.81%	31
CHRT (Propensity)	21	11		12	4		2	100%	19
CHRT (Impulsivity)	6	3		5	4		0	66.66%	6
CHRT (Suicidality)	8	6		4	0		2	100%	6
CHRT (Total)	35	20	0	21	8	0	4	94.29%	31
KI Dose (mg)	52	65		75	90	100			

Figure 1: Summary of Neurobiologic Changes



Conclusions

- KI combined with CSB showed immediate and prolonged benefits 394 days later regarding the symptoms of PTSD, anxiety, depression, suicidal ideation, and cognitive deterioration (per patient report).
- KI combined with CSB can markedly reduce symptoms of PTSD, psychiatric comorbidities, and cognitive dysfunction.