

Risk of Angiogenesis and Vascular Uptake Among Cervical Epidural Steroid Injection



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Background

Cervical epidural steroid injection (CESI) are a relatively safe treatment option in management of cervical pain. Noted adverse events following the procedure are usually minor, self-limited; however, significant adverse events such as neurovascular Complications, space-occupying lesion and endocrinologic effects can occur [Schneider & Maybin, 2018]. In rare instances, repeated corticosteroid exposure in select patient populations may increase the risk of pronounced neuro-vascular complications.

Disclosure: As the case report is devoid of patient identifiable information, it is exempt from IRB review requirements as per Northwestern Medical policy.

Case Report

Patient in their 80s with a past medical history notable for breast cancer s/p surgery/radiation therapy, left thyroid follicular adenoma s/p hemithyroidectomy, chronic neck pain s/p C2-C5 anterior spinal fusion, 10-year course of multiple cervical and lumbosacral interventions involving corticosteroid exposure for pain management presented with exacerbation of chronic cervical pain. Symptoms worsened with heavy object carrying, prolonged sitting, position changes. Denied bowel/bladder dysfunction or saddle anesthesia

Physical Examination:

Neuro-physical examination notable for numbness, tingling in bilateral upper extremities extending to digits, unable to specify.

Imaging:

MRI cervical spine demonstrated intact surgical instrumentation with post-surgical changes, diffuse facet degenerative changes in C1-C7 and posterior osteophyte-disc complex with uncinate hypertrophy at T1-T2.

Procedure:

A C7-T1 interlaminar cervical epidural steroid (IL-ESI) injection was attempted. Initial contrast dye spread after achieving loss of resistance confirmed epidural spread, however; vascular uptake (V.U) was noted. The T1-2 level was attempted, positive for V.U as well despite needle repositioning, eventually procedure was aborted. On a follow-up, T1-2 midline IL- ESI attempt was positive for V.U, resulting in a T2-3 IL-ESI, negative for V.U (1% lidocaine 1cc + Triamcinolone 80 mg in epidural space).

History of neovascularization secondary to upregulation of pro-tumourigenic markers among oncological disorders such as breast malignancy, may increase risk of vascular injury in cervical epidural steroid injections

Figure 1a – A/P C7-T1 IL ESI

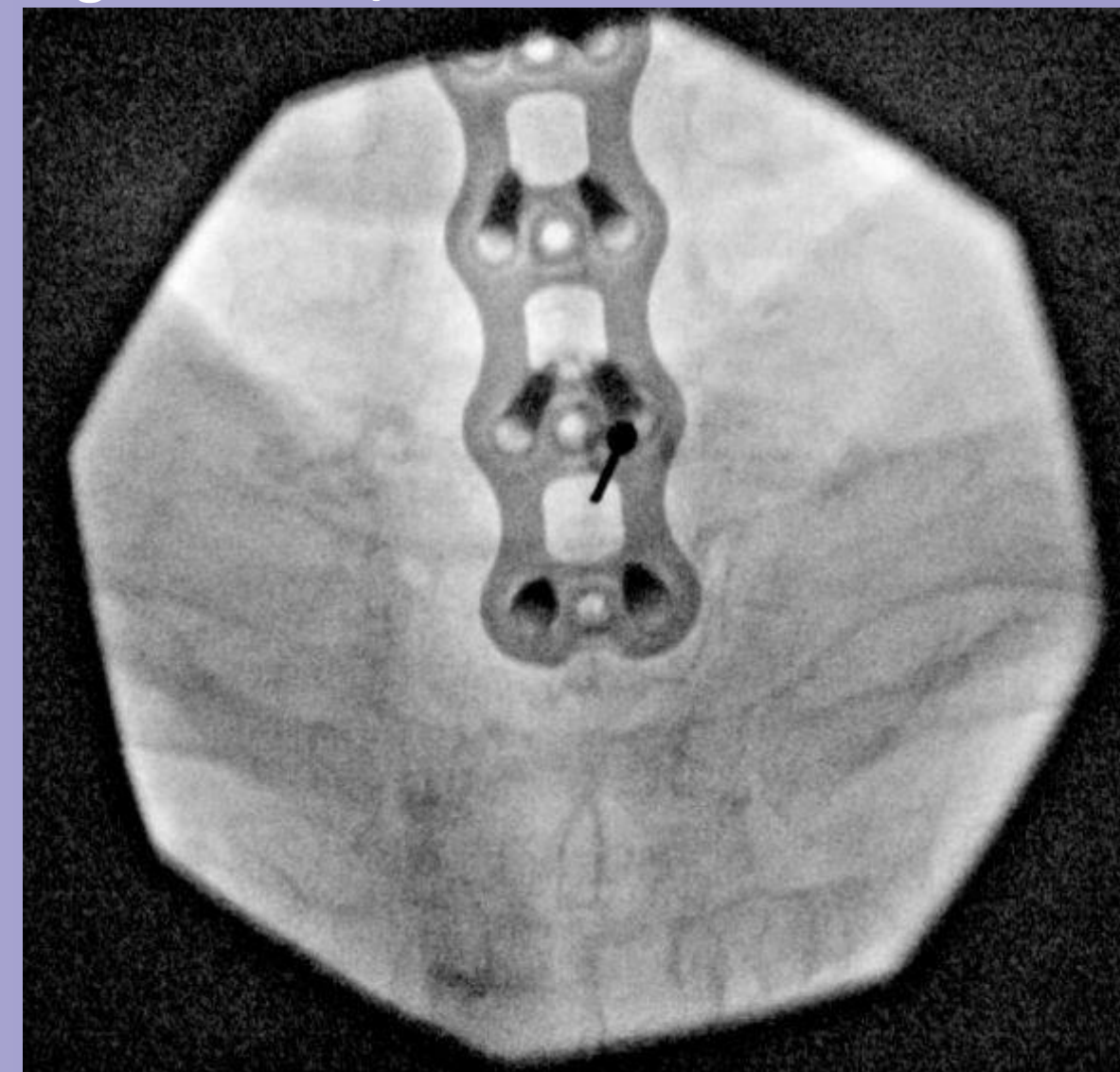


Figure 1b – DSA T1-T2



Figure 2: Effect of GC of NO

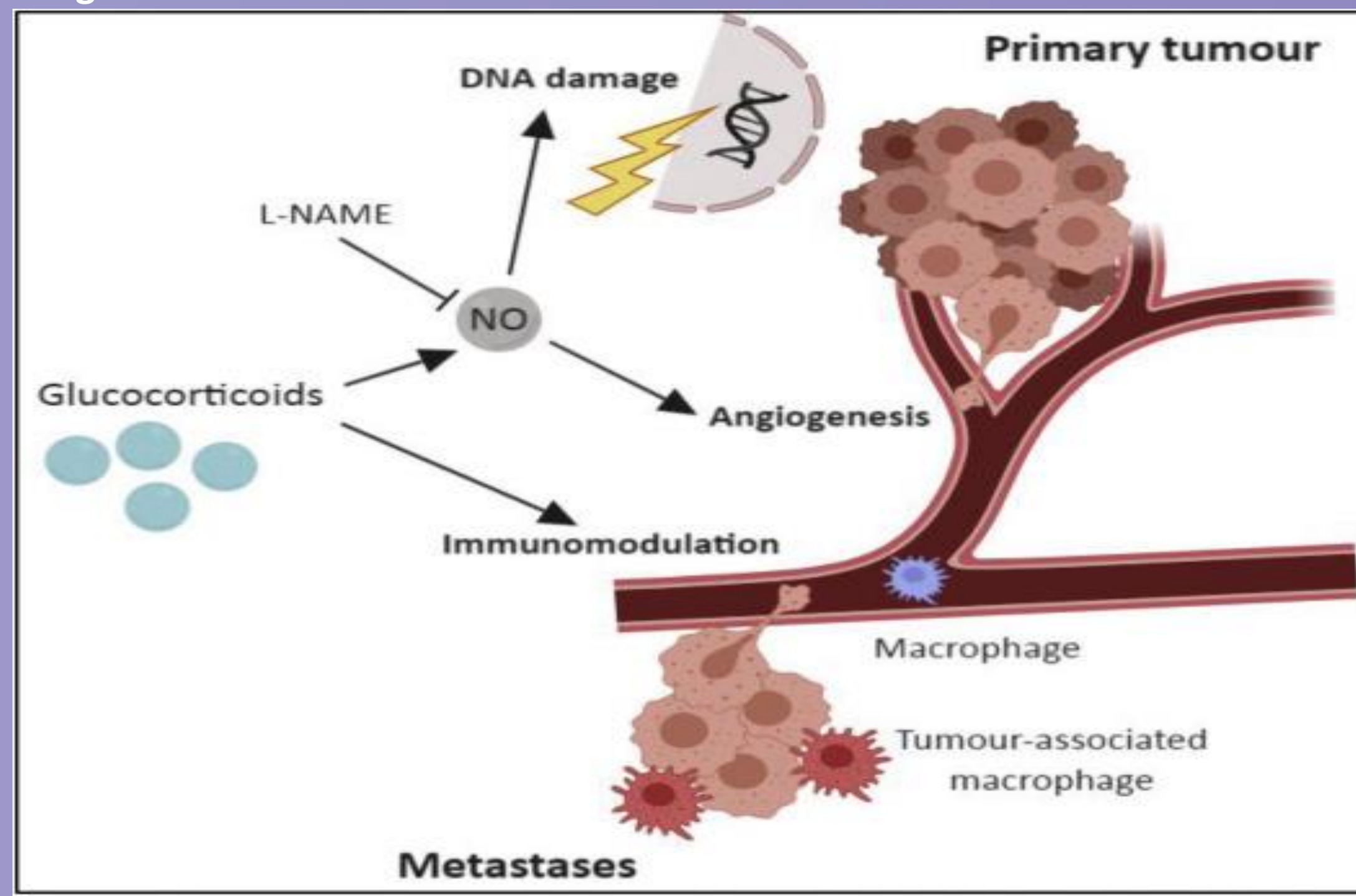


Figure 3a – A/P T1-T2 IL ESI

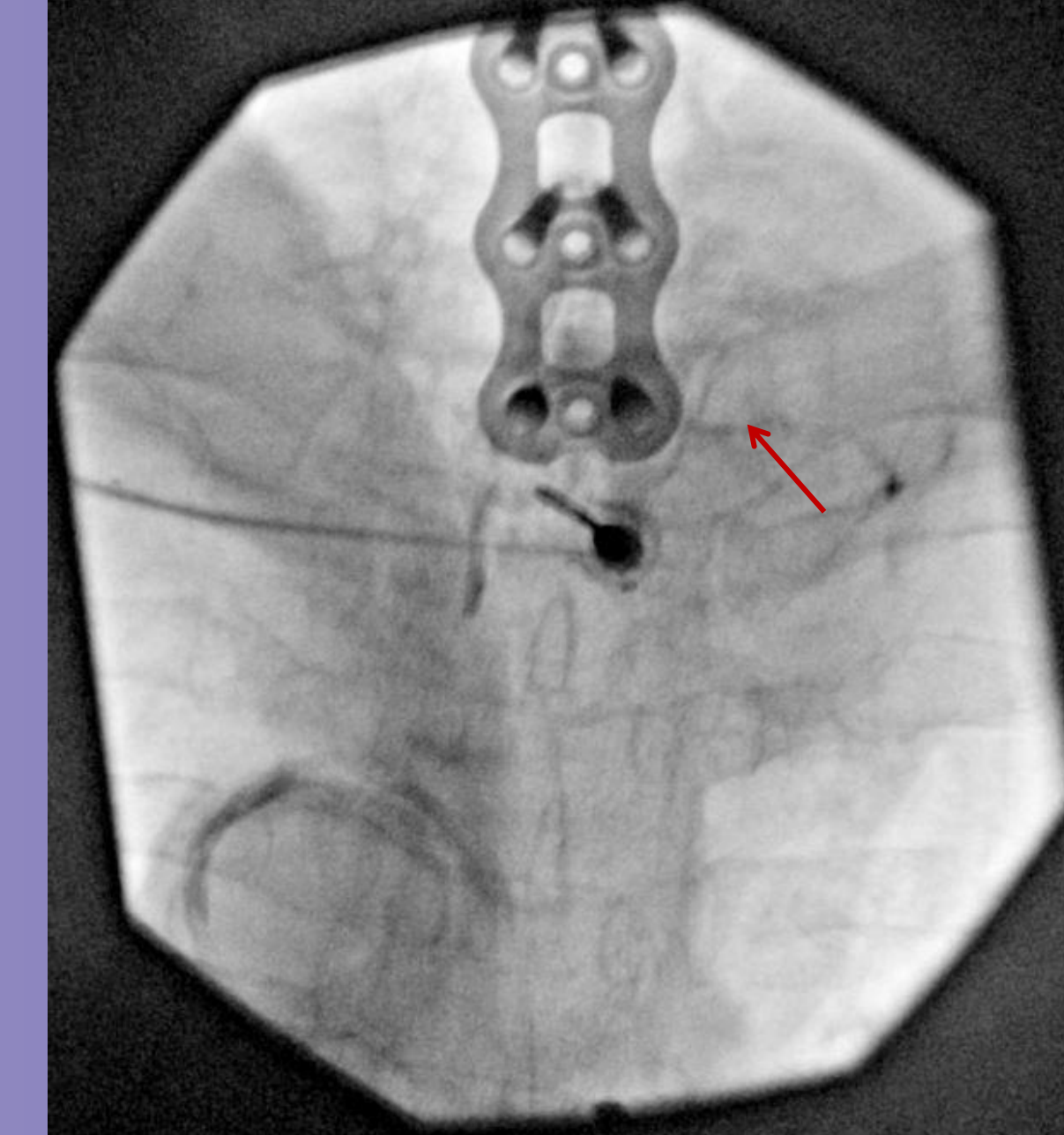
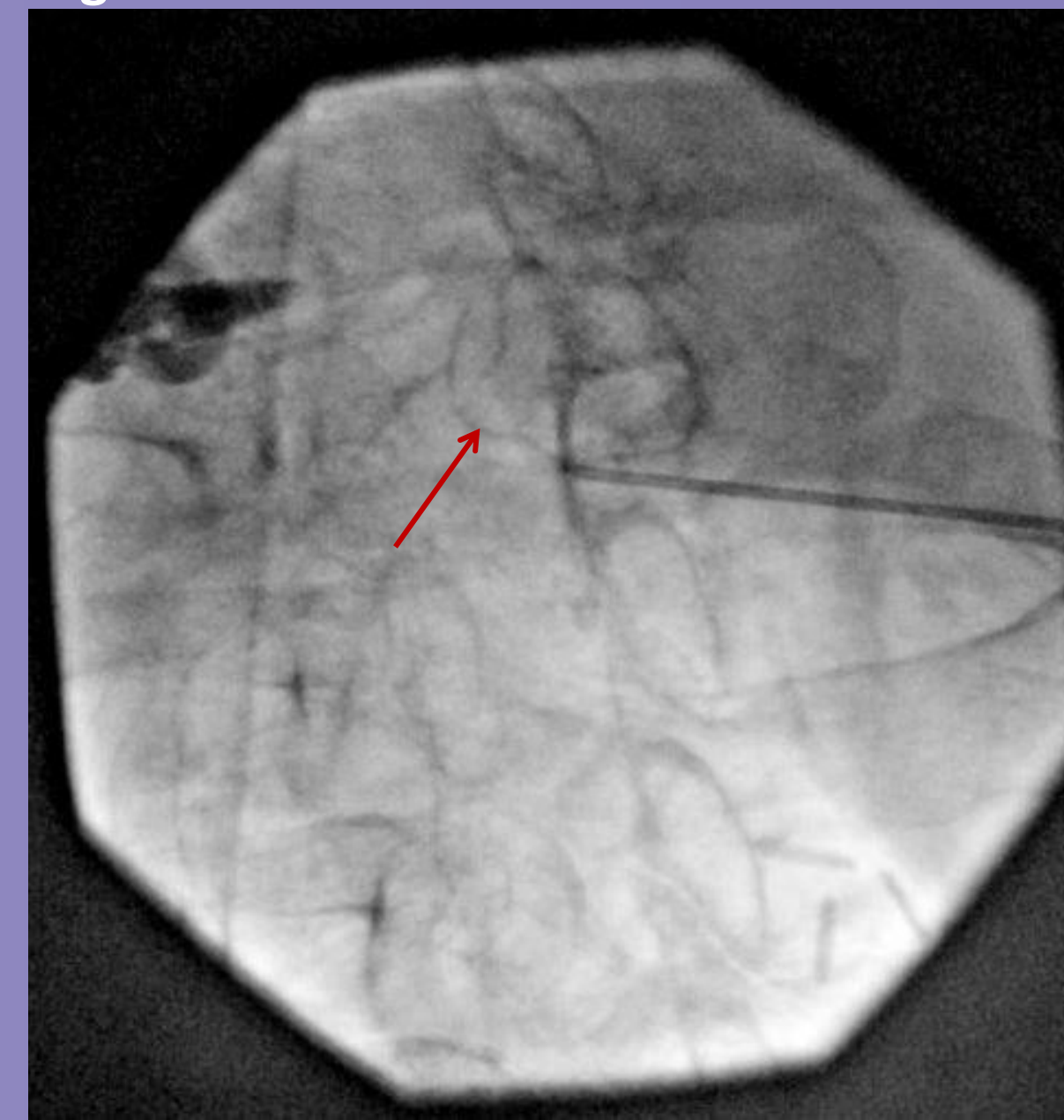


Figure 3b – Lateral T1-T2 IL ESI



Discussion

It is well known that long-term administration of glucocorticoids (GC) is associated with systemic side effects and can impact regulatory systems within the body [4]. Significant vascular injuries secondary to CESI can occur. The posterior internal vertebral venous plexus, responsible for draining the interlaminar space and circulating blood back to the right atrium via paired vertebral veins and right and left brachiocephalic veins is often implicated in injuries [9]. Generally, GCs regulate angiogenesis through suppression of proliferation, sprouting of endothelial cell as well as via reduction in secretion and/or expression of cytokines involved in upregulation of angiogenesis [7]. Studies have demonstrated that GCs signaling mediated through the glucocorticoid receptor (GCR) can promote tumorigenesis in breast cancer cells [1]. GCs mediate a non-genomic effect on inducible nitric oxide synthase (iNOS) resulting in an increase of nitric oxide (NO), observed in breast cancer [1,2,3]. It is suspected that elevated levels of NO can contribute to induction of angiogenesis [4]. In vitro studies noted cortisol upregulation of VEGF, pro-metastatic marker, that mobilizes intracellular calcium, inducing endothelial NOS and the production of NO, increasing the angiogenic potential by creating a feedback mechanism with VEGF inducing NO, and NO upregulating VEGF [8].

Conclusions

Among patient populations with medical history of oncological disease such as breast cancer, risk of vascular uptake while undergo ESI may be elevated due to neovascularization secondary to upregulation of pro-tumourigenic markers. As such, prudent effort, procedural selection and patient identification must be taken to minimize risk of complications.

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