



"Is capillary refill time still a reliable and useful test for evaluating tissue perfusion in injured limb?"

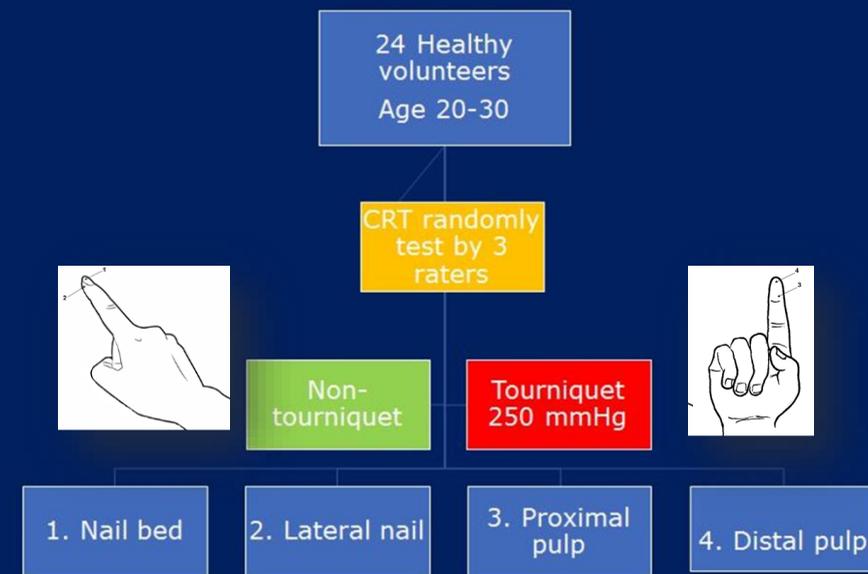
Yuwarat Monteerarat MD, Roongsak Limthongthang MD, Saichol Wongtrakul MD, Panupan Songcharoen MD and Torpon Vathana* MD
 Department of Orthopaedic Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

*corresponding author

Introduction

Capillary refill time (CRT) is traditionally used as a clinical indicator of tissue vascularity either after limb injury or after revascularization. However, some argued that CRT is an unreliable method as some devascularized digits can appear to have normal CRT. In addition, previous studies failed to demonstrate the correlation between capillary refill time and tissue perfusion. CRT can be checked at several areas, however no convincing evidence demonstrated which area is more accurate than others. We therefore investigated whether the test itself is not reliable or the area of the test is not an appropriate site to assess CRT.

Methods

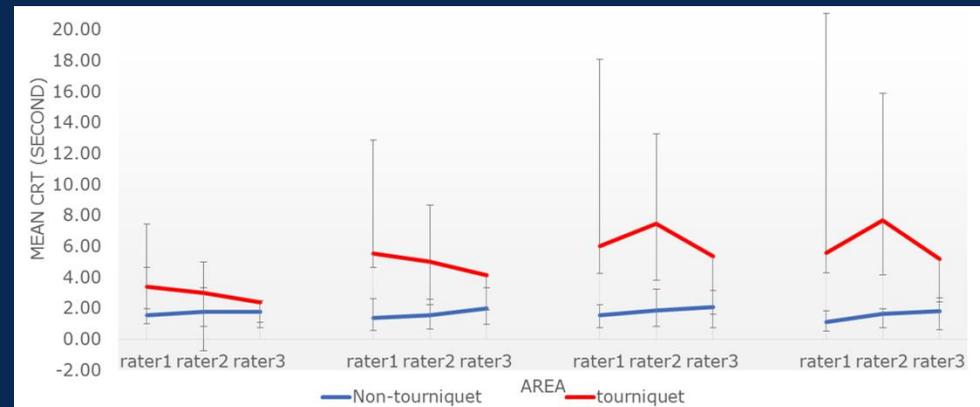


-Controlled environment including light and temperature

Results

- CRT of all four areas of digit had significant mean different between tourniquet and non-tourniquet ($p < 0.05$). (Figure 1)
- **Subtle different in CRT of fingernail (1.22 seconds)** compared to lateral paronychia (3.26 seconds), proximal pulp (4.46 seconds) and distal pulp (4.085 seconds). (Figure 2)
- In normal limb (non-tourniquet) CRT had **fair inter-observer reliability (ICC=0.51)** but very **poor ICC in occluded limb (ICC=0.13)** when tested at fingernail. However, CRT still had **reasonable inter-observer reliability when tested at lateral paronychia and finger pulp (ICC= 0.75-0.81 in non-tourniquet vs 0.62-0.68 in tourniquet)**. (Table 1)

Figure 1. CRT at different areas



	rater1	rater2	rater3									
Non-tourniquet	1.57	1.78	1.77	1.36	1.57	1.99	1.56	1.84	2.10	1.11	1.63	1.75
Min NT	0.56	0.97	1.03	0.81	0.91	1.03	0.84	1	1.34	0.59	0.9	1.19
Max NT	3.07	1.53	0.72	1.28	1	1.32	0.69	1.38	1.06	0.72	0.35	0.88
tourniquet	3.40	3.01	2.38	5.55	5.03	4.12	6.04	7.48	5.37	5.57	7.70	5.18
Min T	1.41	3.78	1.28	0.93	2.79	2.22	1.78	3.69	3.75	1.28	3.56	2.75
Max T	7.78	4.03	1.97	7.75	7.31	3.63	10.12	12.07	5.81	9.31	15.5	8.18

Figure 2. Mean different CRT (Tourniquet vs Non-tourniquet)

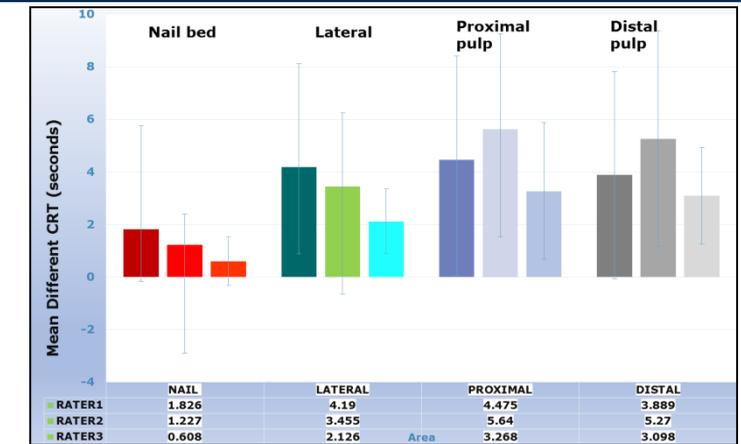


Table 1. Intraclass correlation (ICC) between rater

Intraclass Correlation (ICC)	Non-tourniquet	Tourniquet
Nail bed	0.514	0.132
Lateral side	0.747	0.628
Proximal pulp	0.789	0.654
Distal pulp	0.810	0.688

Conclusion

- **Nail bed CRT is unreliable** which could explained why CRT had poor sensitivity in previous studies.
- From our study, **the most reliable and applicable area for CRT testing is finger pulp** either proximal or distal pulp.
- **Lateral paronychia** is also one of reliable area, however **difficult to assess** due to its position especially in splinted hand.
- CRT is still a useful and reliable method to evaluate tissue perfusion in injured limb when tested at appropriate area.