# Learning to use a near infrared sytem (Veinsite® Vuetek®scientific) to improve peripheral intravenous cannulation in children.

Jean-Pierre Monrigal, M.D., Gerald Boussicault, M.D., Laurent Colbus, M.D., Catherine Jeudy, M.D., Jean-Claude Granry, Ph.D
Department of Anesthesiology, Centre Hospitalier Universitaire, ANGERS, France

Introduction: Devices using the near infrared technic have been proposed to improve venous visibility and facilitate venous cannulation. This study describes the learning curve of the Veinsite® in operators well trained in venous cannulation in children.
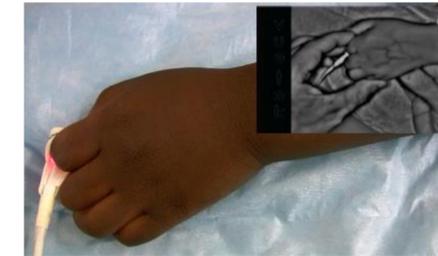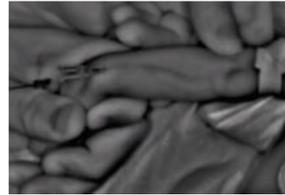
Material and methods: Prospective study (December 2014) (approval by our Institutional Ethics Committee). Thirteen operators [8 anesthesiologists and 5 nurses in anesthesiology, working in pediatric anesthesia and the intensive care unit (PICU)] used, for the first time, the Veinsite® [a head -mounted device including a portable near infrared emitter, allowing a direct vision on the skin(moving eyes downwards) and the enhanced near infrared vision of the vein in the screen of the helmet (head-up display) ; possibility of external display by optional monitor]. Each operator had to successfully cannulate 6 veins (learning curve for the equipment manufacturer : 5). The procedure was controlled on the satellite screen by an observer. Placement of venous cannulation in children (age, sex ratio, weight, height, BMI, Fitzpatrick classification in 6 phototypes) undergoing surgery, under O_2-N_2O - sevoflurane. Clinical evaluation of the veins : visibility (good- poor-none), palpation after placement of the tourniquet (good-poor-none). Each operator can stop in case of repetitive failure. At the end, each operator answered a Likert scale (5 items : from totally convinced to absolutely not convinced) and evaluated the procedure: 6 items noted (10 points each) : ergonomy, vision, gesture, locating the vein, puncture, cannulation) ; training: enough or not. Statistical study by SPSS.

Results: For 78 peripheral intravenous cannulations successfully placed, 122 punctures (more than 6 patients and 6 trials for several operators) ; age (median, range): 4yrs (3 mths-16 yrs), weight: 14 kg (3.4-54). height: 105 cm (54-171), BMI: 16 (11-23), sex ratio: (M/F 68%), phototype VI: 4%. Venous visibility: good 49%, poor 23%, none 28%; venous palpation: good 52.5%- poor 13%, none 34.5%. Puncture failure: 19% - cannulation failure: 17% ; Cannulation performed : on external vision alone (2.5%), on infrared vision alone (29.5%), on a mixed vision (68%). Choice of the successfully cannulated vein : in 66.5% the same vein detected both clinically and by Veinsite, in 33.5% the veinsite detected vein was preferred (better quality or only one present). Likert scale (totally convinced 5/13 operators, rather convinced 7/13, no opinion 1/13). For all operators the training was sufficient. Concerning the procedure : locating the best vein 9/10, ease of puncture and cannulation 7.5/10, ergonomy 7/10.

Discussion: The operators were globally convinced by this device. The main advantage of the helmet is to allow a hands-free procedure, and above all it allows the operator to combine direct vision which facilitates puncture (it is not a 3D system and there is no notion of depth) and the near infrared vision to find a vein which is clinically non visible. This device optimizes the procedure of venous cannulation, by finding the best vein for the catheter.