

# Coaptive Film Versus Subcuticular Suture: Comparing Skin Closure Time Following Identical, Single-session, Bilateral Limb Surgery in Children

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**Background:** This study is a randomized controlled trial comparing skin closure time between coaptive film and subcuticular monocryl sutures in children undergoing identical single session, bilateral limb multiple soft tissue releases.

**Methods:** Eight children less than 18 years of age (mean 14.5) with cerebral palsy underwent identical, single session bilateral multiple soft tissue releases in the lower limb from August 2005 to March 2007. There were 50 incisions in all in which 25 incisions were closed with 4-0 intracuticular monocryl sutures and 25 were closed with coaptive film (Steri Strip S; 3M company). Time taken for closure using either technique was recorded. A blinded plastic surgeon used a visual analog scale to assess the cosmetic results at the end of a 3 month follow-up.

**Results:** The average length of incisions closed with coaptive film was almost identical to the corresponding incision on the contralateral limb that was closed with subcuticular monocryl suture (4.45 and 4.81 cm,  $P = 0.66$ ). The average time for skin closure using monocryl sutures was 167.04 seconds compared with the average time of 79.36 seconds when using coaptive film ( $P < 0.0001$ ). There was no significant difference in the cosmetic results or the number of wound complications using either technique.

**Conclusion:** Coaptive film is an attractive and cost-effective option for skin closure after pediatric surgery.

**Clinical Relevance:** The time saved, comparable cosmetic results and lack of complications makes coaptive film an attractive option for skin closure in the pediatric age group.

**Key Words:** skin closure technique, bilateral limb surgery

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Wound closure techniques after surgery include synthetic sutures, absorbable sutures, staples, tapes, and adhesive compounds. Techniques that require removal of sutures or staples after healing can cause anxiety

in the pediatric age group. Hence subcuticular monofilament absorbable suture has become the standard skin closure technique in children. Coaptive film has been recently introduced as a primary skin closure technique. Once the skin incision heals it falls off on its own and does not require formal removal, which also makes it an attractive option in children.

Children with cerebral palsy routinely undergo multi-site simultaneous tendon surgery of the lower limbs that aims to improve gait by addressing hip, knee, and ankle contractures. Incisions that are identical in length and have similar locations on corresponding parts of both lower limbs are performed hence offering one limb as a control when comparing 2 skin closure techniques.

Our study is a randomized controlled trial comparing skin closure time between coaptive film and subcuticular monocryl sutures in children undergoing identical single session, bilateral limb multiple soft tissue releases. We also aimed to look for differences in cosmetic results and the presence of wound dehiscence in the patients studied. The coaptive film we used in this study is commercially known as Steri Strip S and was formerly known as ClozeX. Kuo et al<sup>1</sup> found this closure technique to be effective, safe, and have equivalent cosmetic results to standard cutaneous sutures. Our study aims to assess the potential time that could be saved, in the hope of reducing OR costs/charges, using this coaptive film and if the coaptive film has cosmetic results equivalent or better than intracuticular sutures in pediatric patients.

## MATERIALS AND METHODS

Eight children under 18 years of age with cerebral palsy underwent identical, single session bilateral limb surgery from August 2005 to March 2007. There were 4 males and 4 females. Mean age of the patients was 14.5 years. Each patient underwent single session identical bilateral limb surgery with the same surgeon performing skin closure using both techniques. Surgeries performed were adductor, hamstring and heel cord lengthening and rectus femoris transfers. Skin closure time was recorded in seconds. A total of 50 incisions were closed in 8 patients (mean of 6.25 incisions per patient) using the above techniques of which 25 incisions were closed with 4-0 intracuticular monocryl sutures and 25 were closed with coaptive film (Steri Strip S; 3M company, 3M Center St Paul, MN) Time taken for skin closure in seconds was

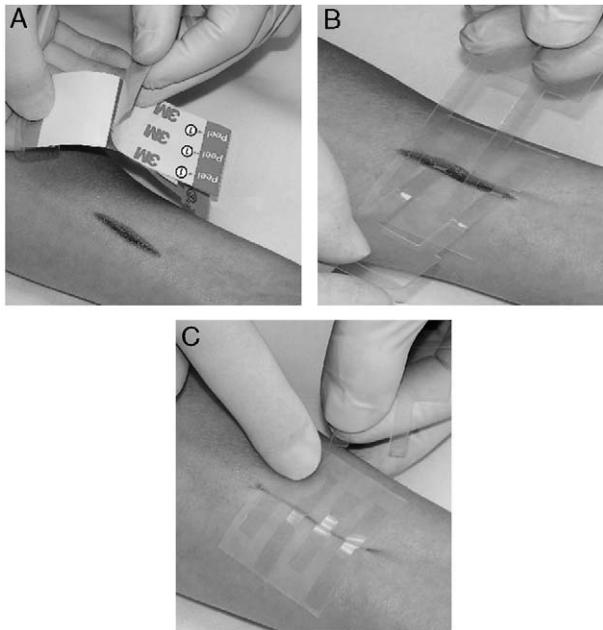
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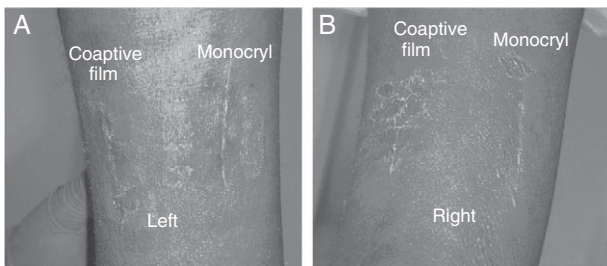
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**FIGURE 1.** A to C, The technique of application of coaptive film. The skin surface has to be completely dry before application. Strips of film (varying lengths are available) with connecting tabs are applied to skin on either side of incision. Connecting tabs are pulled across to close the incision and stuck down on the film at the desired tension. The excess film is then clipped off.

noted. Before skin closure, deep fascia was closed with interrupted 1-0 Vikryl and subcutaneous tissue was closed with interrupted 2-0 undyed vikryl. Start time was observed once surgeon asked for either the coaptive film or the 4-0 monocryl suture and it was placed in his hand. End time was noted once the coaptive film was deemed to be in place or the last steristrip was placed over the incision closed with subcuticular suture. As bilateral limb surgery was performed each coaptive film incision had a control on the same patient with monocryl sutures (ie, left adductor incision closed with coaptive film and right adductor incision closed with 4-0 monocryl; choice of skin closure technique was randomized to limbs). Figures 1A–C show the technique of application of coaptive film.



**FIGURE 2.** A and B, Closure techniques used and 3-month follow-up pictures after bilateral medial and lateral hamstring lengthening.

**TABLE 1.** Comparison of Time Taken for Closure in Seconds and Cosmetic Results Using Visual Analogue Scale

Material	Average Incision Length (cm)	No. Incisions	Cosmetic Score Mean on VAS (1-10)	Average Time for Closure (s)
Coaptive film	4.45	25	4.94	79.63
4-0 Monocryl	4.81	25	5.44	167.04

VAS indicates visual analog scale.

**RESULTS**

Incisions closed with coaptive film needed less time when compared with corresponding incisions on the contralateral limb (Table 1). The average time for skin closures using monocryl sutures was 167.04 seconds compared with the average time of 79.36 seconds when using coaptive film ( $P < 0.0001$ ). The average incision lengths were closed with coaptive film was 4.45 cm compared with an average of 4.81 cm closed with subcuticular closure ( $P = 0.66$ ). Cosmetic differences were assessed by a blinded plastic surgeon using a 1 to 10 visual analog scale (10 is the highest score), the sutures scored an insignificant amount higher ( $P = 0.44$ ). There were no complications or experiences of wound dehiscence. Figures 2A and B show closure techniques used and 3 months follow-up pictures after bilateral medial and lateral hamstring lengthening.

**DISCUSSION**

Both coaptive film and subcuticular skin closure using monocryl are attractive options for skin closure after surgery in children as neither need to subject a child to the trauma of suture or staple removal. A study using a similar design compared blepharoplasty in the eyelids of 20 patients in which one side was closed with a tissue adhesive, octyl-2-cyanoacrylate (Dermabond) and the other with a 6.0 suture.<sup>2</sup> The study resulted in the same cosmetic appearance (4wk after surgery) with a faster closure time for the tissue adhesive (7 min opposed to 8 min), and no incidences of dehiscence. Our study determined that coaptive film takes less time to perform skin closure than subcuticular closure using monocryl. The average time saved was 87.68 seconds and when taking the average number of incisions that was 6.25 per patient into account, the resulting time saved was 548 seconds or 9.13 minutes. There were no complications using both techniques and the cosmetic results were similar with no significant statistical difference ( $P = 0.44$ ). Although the time saved may seem inconsequential, using the coaptive film has the potential to save tremendous resources because of high operating room costs. When one accounts for the thousands of operations a hospital has each year, use of the coaptive film has the potential to save a substantial amount of hospital resources, and in turn cause less financial burden on the taxpayer. The cost of the coaptive film used is \$20.00 for 40 mm and \$33.00 for an 80 mm wound which is more than the \$4.50 for a 4-0 monocryl suture. This price difference is insignificant,

however, when the average charge for the main OR at our institution is \$2259 for every 0 to 30 minutes, which is \$75.30 a minute. In the Same Day Surgical Unit the charges are \$1927 for every 0 to 30 minutes, which is \$64.20 a minute. Thus, the cumulative effect cutting the aforementioned costs over the thousands of surgeries done per year will benefit a health center and its future patients.

## REFERENCES

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