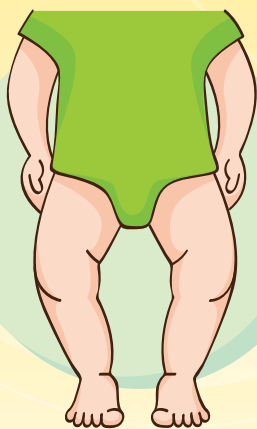


兒童常見的步姿問題

Common Walking Problems in Children



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Introduction 前言

Skeletal development of lower limb

下肢骨骼的發展

The maturity of lower limb alignment depends on the proper stimulation during growth. The baby is born in a flexed posture. With normal development and stimulation, our bones, joints and muscles matures with time. This pamphlet introduces four common conditions of skeletal development in children including bow leg, flat feet, in-toeing and tip-toeing walk.

正常的下肢骨骼發展取決於正確的生長刺激。初生嬰兒的肢體是屈曲的，通過正常的發展，骨骼、關節和肌肉續漸成長。

本小冊子介紹了四種常見的小兒骨骼發展問題，包括“O”形腳、扁平足、“入”字腳及腳尖走路。

Common skeletal problem in children 常見的小兒骨骼問題

I. Bow leg 弓形腿, “O”形腳 (圖 1)

- Babies are born with physiologic bow legs. This is normal at birth. The knee becomes straight at around the age of 2, then bends out afterwards. Maximum bending out angle occurs at about age 3. It then gradually reduces and becomes stabilized at age 9.
- 初出生的嬰兒都是有少許“O”形腳，這現象是正常的，外觀上嬰兒的膝部好像是向內翻的，此角度約於兩歲時便會變直，內翻繼而變得相反的向外翻而最明顯外翻的時間約發生於三歲時，此後，外翻的角度會慢慢減少並會於九歲時停止。

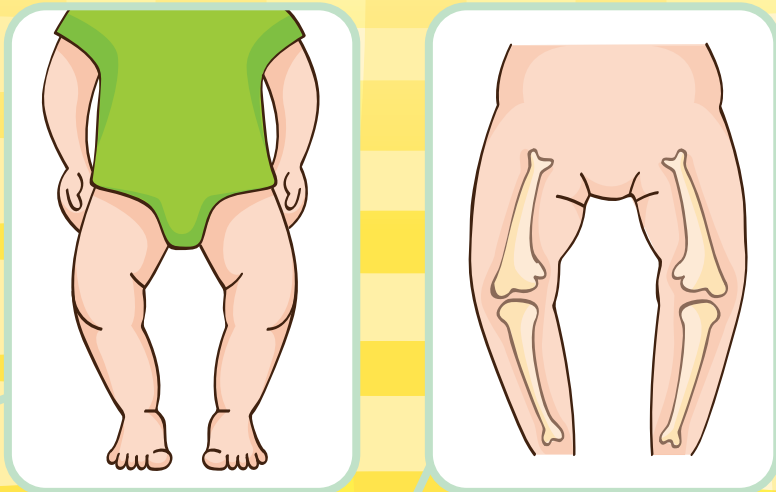


Figure 圖 1

Knee alignment 膝部 內翻/ 外翻

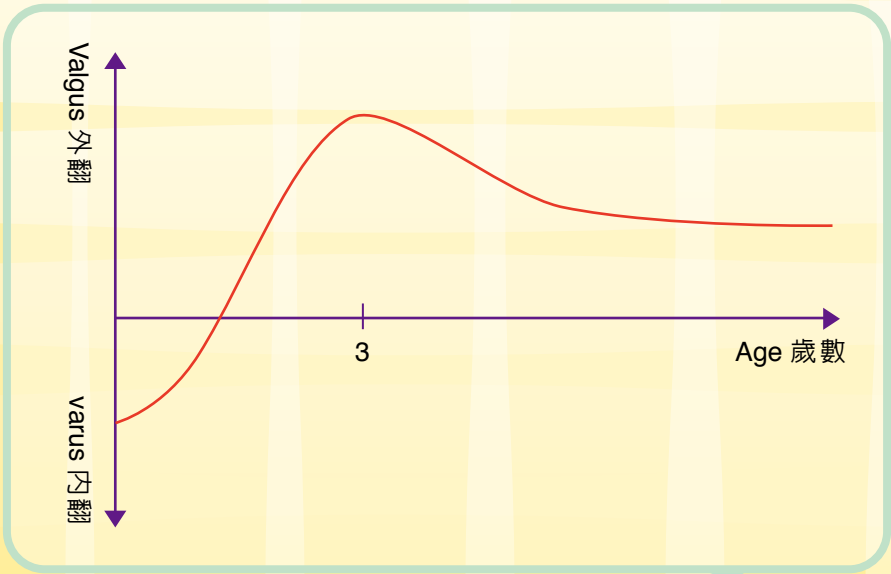


Figure 圖 2

Figure 2 shows a graph of knee angle changes against age. The knee of a new born baby is in slight varus (bend in, figure 3a), with normal development, the knee gradually straightens (figure 3b) and subsequently becomes valgus (bend out, figure 3c). The maximum valgus angle is achieved at around 3 years of age. The knee valgus slowly reduces and remains at mild valgus at skeletally maturity.

圖2 顯示初生嬰兒的膝關節是內翻(圖3a)的，通過正常發展，膝關節會漸漸變直(圖3b)而會外翻(圖3c)，外翻的情況約在三歲時會最明顯，此後便會慢慢減少，到發育成熟時，膝關節會維持少許的外翻。

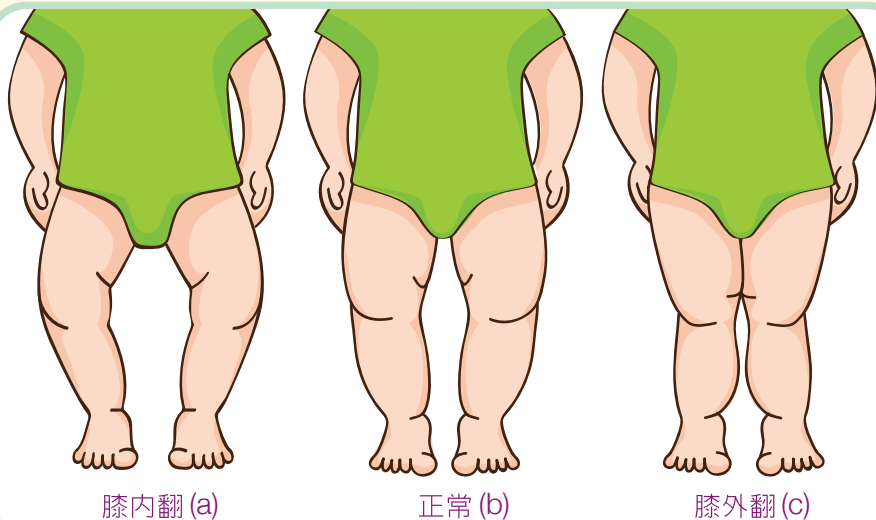


Figure 圖 3

Bow legs not only cause cosmetic problem, but may also lead to pain. When the knee is in varus, the inner side of knee joint will be over stressed. In such situation, the ankle will then be forced to varus. The weight bearing point of the sole will shift to the outer side causing development of callosity. Shoe wear is therefore easily broken.

“O”形腳不但影響外觀，患者膝關節內側會受力過大而引致痛楚，因膝部變形而踝關節和足部會被迫內翻，著地點會集中在腳底外側而引起皮膚硬化，鞋的外側亦很快被磨損。

As bow legs improve with growth, there is no urgency for treatment. The doctor will observe the change regularly. Strengthening exercise for the knee such as cycling and stepping up and down can improve the stability of knee and thus provides better support. Physiotherapist will measure the knee alignment at regular intervals. Should there be any deterioration of condition, the patient will be advised to seek medical consultation for further investigation.

由於“O”形腳是會隨着年齡而改變，所以一般沒有治療的迫切性，醫生一般都會定期觀察骨骼的變化。一些強化膝關節的運動如踏單車和踏樓梯可增強膝關節的穩定性，從而提供更佳的保護。

物理治療師會定期量度膝關節的角度，如發覺變形惡化，患者需要見醫生作進一步檢查。

2. Flat feet 扁平足

Physiological flat feet are present in babies and toddlers. With normal development, foot arch will gradually develop and mature at around age 6. Flat feet may persist after age 6 in children who have familial flat feet, lax joints or pathological flat feet such as congenital bone disease. Flat feet are frequently seen on children with hypotonia. This is because low muscle tone will lead to inefficiency of the muscle pulls that hold the normal foot arch.

嬰兒及小童的足弓由於未發展成熟一般都比較扁平，經正常的生長，足弓會漸漸發展並約於六歲時成形，如有家族遺傳，韌帶過鬆或其他足科病變(如先天性足關節融合)的問題，足弓便不會形成。扁平足亦常見於肌肉張力低的小童，由於他們的肌肉處於低張的狀態，足弓便沒有足夠的承托。

Functional problem 功能障礙:

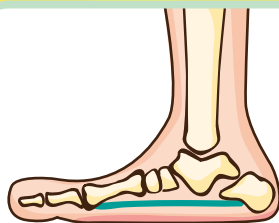
- **medial foot pain** 足內側疼痛
- **inability to hop** 不能單腳跳
- **poor running or jumping** 跑步或跳動困難
- **easy tiredness** 容易疲勞



Figure 圖 4
Flat foot 扁平足



平常足弓
Normal arch



扁平足
Flat arch

The heel cord of flat feet will be shortened as a result of mal-alignment of the foot bones. The shorter the heel cord, the more deformity is resulted. Therefore patient needs to do stretching exercise and massage (figure 5) to stretch out the tight heel cord (figure 6). Moreover, the calf muscles will be weakened as a result of mal-aligned muscle pull. Therefore strengthening these muscles is also important (figure 7 and 8).

扁平足患者因足部變形而引致後跟縮短，情況持續可能加重足部變形而引致扁平足惡化。因此患者需做按摩(圖5)及後跟伸展運動(圖6)。再者患者的小腿和脛後肌會因足部變形而變得無力，因此患者亦需要訓練此組肌肉(圖7和8)。

Exercise for flat feet 扁平足運動

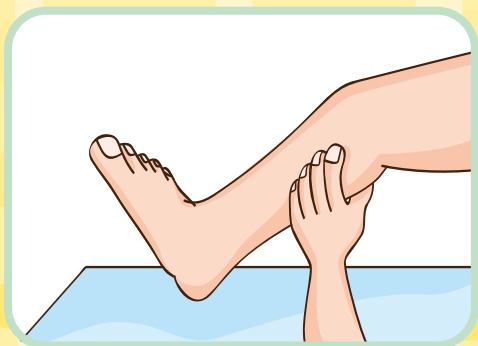


Figure 圖 5
Calf massage 按摩

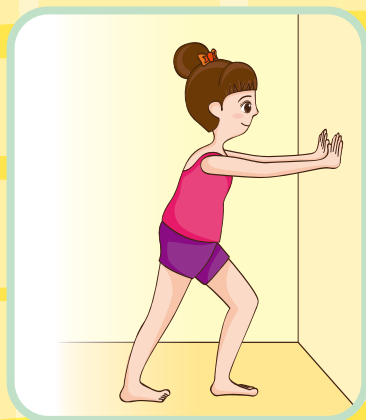


Figure 圖 6
Heel cord stretch 後跟伸展

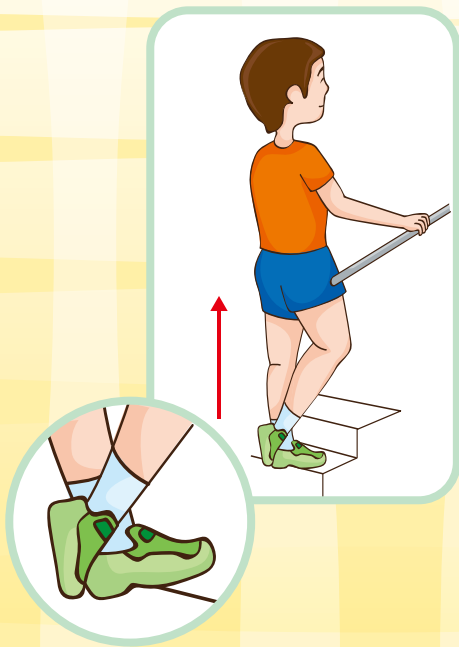


Figure 圖 7
Calf strengthening
小腿肌肉訓練



Figure 圖 8
Tibialis posterior
strengthening
脛後肌訓練

足部小肌肉的訓練

There are many small muscles at the foot and they may also help supporting the foot arch. Therefore strengthening exercise for these small muscles such as walking on the beach (figure 9) or gripping towel with toes (figure 10) may be beneficial.

足弓的承托也靠足部的小肌肉輔助，因此，小肌肉的運動也可以幫助足弓的形成。例如在沙灘上步行(圖9)或用腳抓毛巾(圖10)。



Figure 圖 9

Walking on the beach or uneven surface

在沙灘或不平坦的路步行

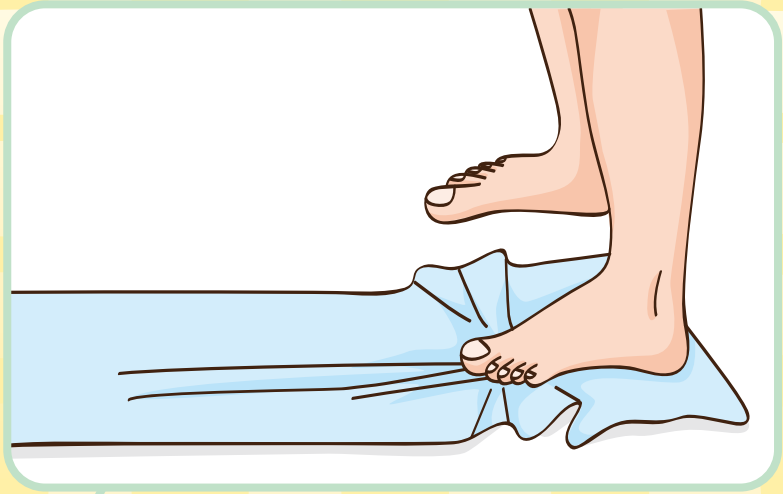


Figure 圖 10
Toe gripping exercise using towel
抓毛巾運動

In severe cases, orthotic treatment (figure 11) can restore the mal-alignment and the heel valgus improves.

若足部扁平嚴重，足弓托治療(圖11)可回復正確的腳形，後跟外翻的情況亦得以改善。

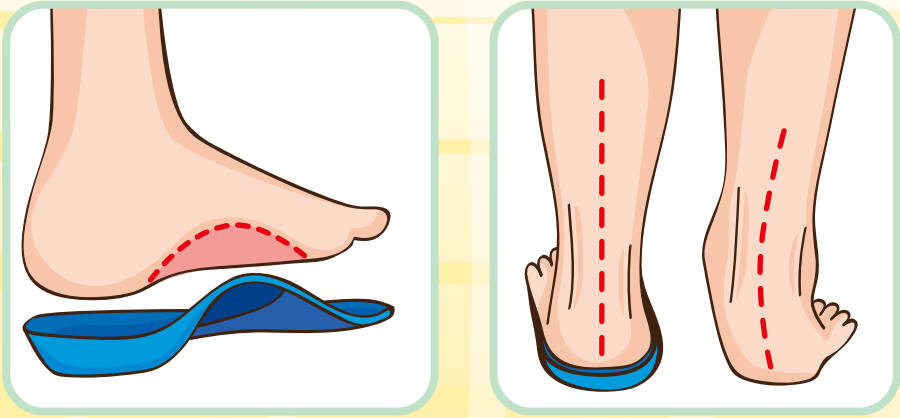


Figure 圖 11
Arch support 足弓托治療

When choosing shoes, parents should select shoes with arch support. The shoe materials should not be too hard or too soft. The size of shoe must be just fit and should not be too large or too small. A pair of oversized shoes will lead to easy tripping and the arch support will not fit the child either.

家長選購鞋時必須注意選擇有足弓承托的鞋，鞋身及鞋底不宜過軟或過硬，也不應選過大的鞋，過鬆的鞋不但不能正確承托足弓，還會因過長過重的關係而引致孩子容易絆倒。

3. In-toeing walk “入”字腳

Children below age of 5 may walk with mild in-toeing. Majority of them are usually due to poor sitting posture such as “W”-sit on the floor (figure 13).

五歲以下的小童可能出現“入”字腳走路的情況，大部份成因都是由於坐姿不正確(如以“W”形坐在地上，圖13)。

Cause of in-toeing walk “入”字腳的成因

The followings are the possible causes of in-toeing walk (figure 12)

“入”字腳的成因有以下三個可能:(圖12)

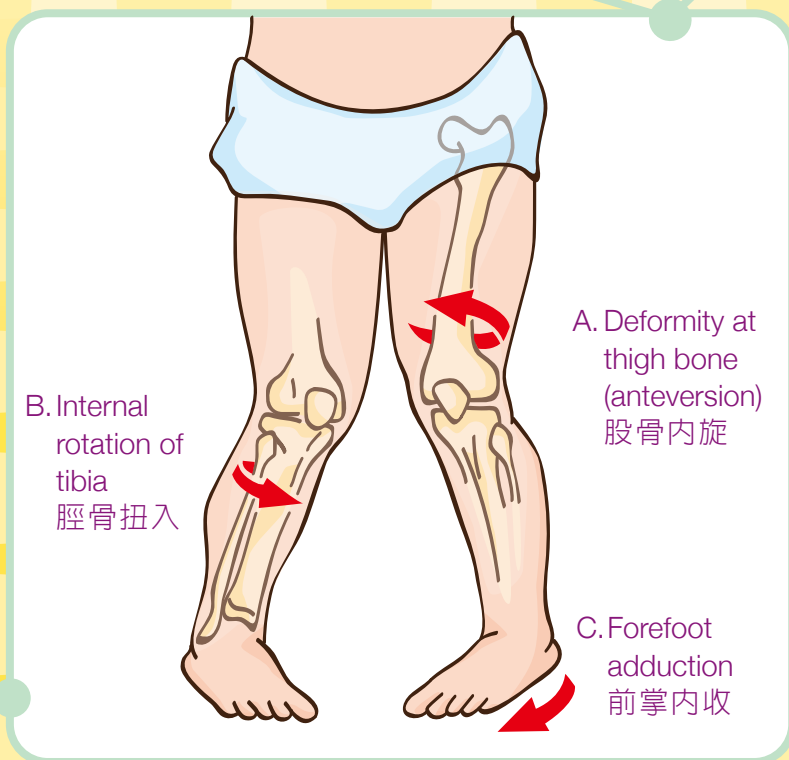


Figure 圖 12

A. Deformity at thigh bone (femur) 股骨內旋

Children below age of 5 may walk with mild in-toeing. Majority of them are usually due to poor sitting posture such as “W”-sit on the floor (figure 13) and increased femoral anteversion angle (an angle formed between femoral neck and the knee axis, figure 14). With normal skeletal development, this angle will gradually decrease and become normalized. However, this angle will not decrease in case of pathological condition and/or abnormal posture. The larger the anteversion angle, the more the in-toeing.

五歲以下的小童可能出現“入”字腳走路的情況，大部份成因都是由於坐姿不正確(如以“W”形坐在地上，圖13)及股骨內旋，即股骨頸與膝關節縱軸形成的角度(圖14)，隨著骨骼的生長，此角度會漸漸減少至正常水平，假如因股骨病變或坐姿不正，此角度便不會減少因而引致“入”字腳。

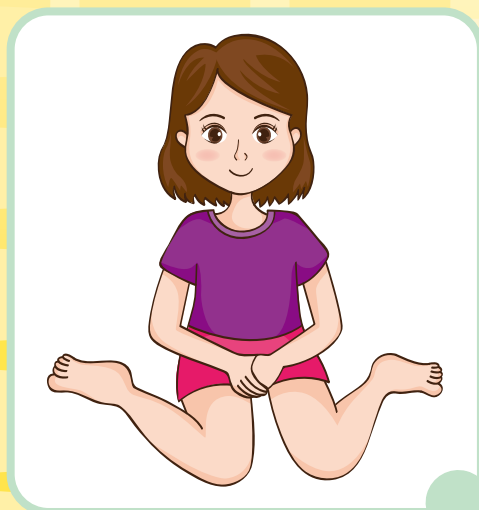


Figure 圖 13
Avoid “W”-sit 要避免“W”形坐下

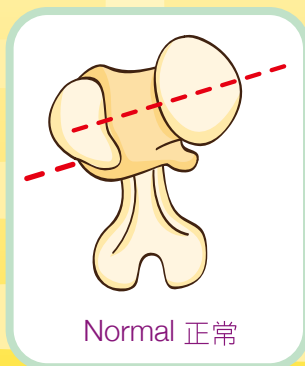


Figure 圖 14 Increased femoral anteversion 股骨內旋

股骨內旋的臨床檢查

Figure 15 shows a clinical test for femoral anteversion. The tester rotates child's hip in both internal and external rotations and compares the difference. If femoral anteversion is increased, there is excessive internal rotation of hip and reduced external rotation.

圖15顯示股骨內旋的臨床檢查，檢查者將患者的髖關節向內及外旋轉，然後比較兩者的差別，如股骨內旋過大，髖關節內旋幅度會過大而外旋則過小。

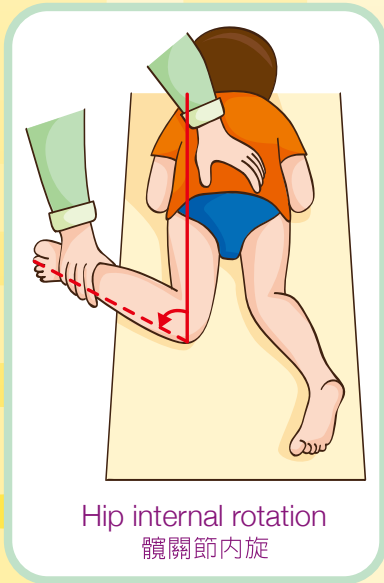


Figure 圖 15

Clinical test for femur mal-rotation:

excessive internal rotation of hip and reduced external rotation.

股骨內旋的臨床檢查患者的髖關節內旋會過大而外旋過小。

B. Internal rotation of tibia (figure 16)

脛骨(即小腿骨)扭入(圖16)

The tibia bone may be deformed and internally rotated as happened in poor sitting posture in situation A. Regular assessment is needed. Stretching out any tight soft tissues may improve the situation and gradual normalize this deformity.

脛骨(即小腿骨)扭入可發生於坐姿不正(A情況)，也有可能是結構性的問題，需要作定期檢查。如有過緊的軟組織，通過運動把其拉鬆後，有助改善脛骨扭入的情況。

Figure 16 shows a clinical test of measuring the rotation of tibia by taking the foot-thigh angle. In this test, the child is lying prone, knee flex to 90 degrees and the foot and thigh axes are compared. Normal angle is 10 to 15 degrees outward.

圖16顯示脛骨扭入的臨床檢查，患者俯臥，膝屈曲90度，然後檢查者量度腳掌與大腿的相對角，正常情況下此角是10-15度向外。

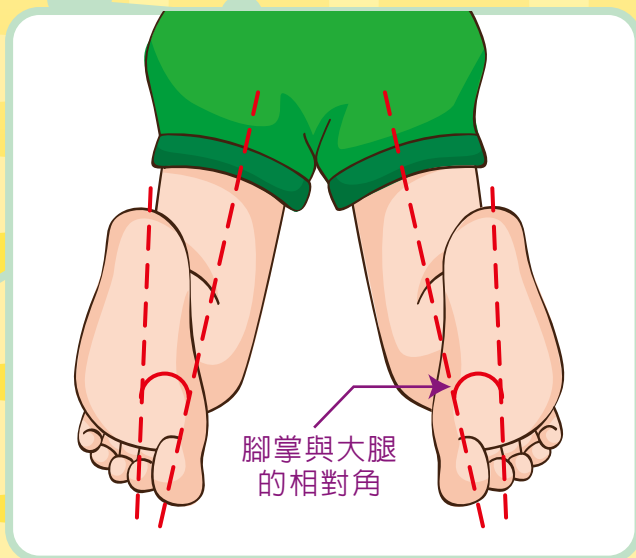


Figure 圖16 Internal rotation of tibia 脛骨扭入

C. Forefoot adduction 前掌內收

Forefoot adduction (figure 17) may also contribute to the in-toeing. It may be caused by inheritance or inborn.

前掌內收也可導致“入”字腳，通常是遺傳或先天變形造成的。

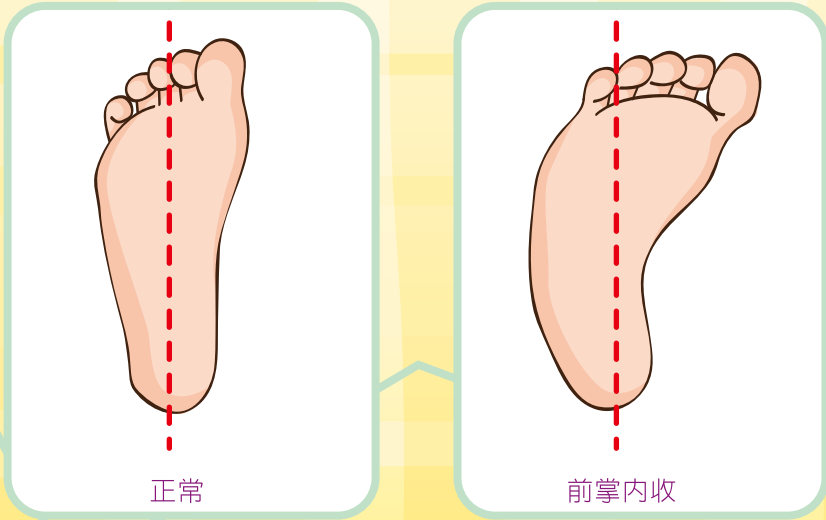


Figure 圖17 Forefoot adduction 前掌內收

Functional problem 功能障礙:

In-toe walking not only cause awkward walking pattern, but also leads to easy falling as feet are easily catching each other. Furthermore, since the muscle pulls are not in the original mechanical advantage positions, these muscles are weakened and children may find difficulty in running and jumping.

“入”字腳除影響外觀外，患者雙腳會容易互相碰撞而引致絆倒。此外，由於下肢處於內旋位置，肌肉不能發揮最有效的功能而引致跑步及跳躍有困難。

Exercise for in-toeing gait “入” 字腳的運動治療



Figure 圖 18

Stretching for left hip 左髖關節的伸展運動

Treatment for in-toeing mainly focuses on stretching out tight hip structures. Figure 18 shows stretching for left hip and figure 19 shows stretching both sides to increase flexibility of external hip rotation.

治療目的在於增加髖關節外旋的活動性。圖18顯示左髖關節的伸展運動以增加髖關節外旋的角度。圖19顯示兩邊髖關節同時進行的伸展運動。

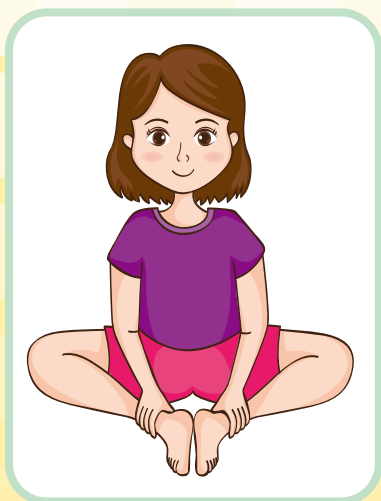


Figure 圖 19
Stretching for both hips
左右髖關節的伸展運動

Figure 20 shows stretching exercise for forefoot adduction. The heel is stabilized and the forefoot is stretched towards the little toe.

圖20顯示改善前掌內收的伸展運動，首先固定踝關節，然後把前掌向尾指的方向推。

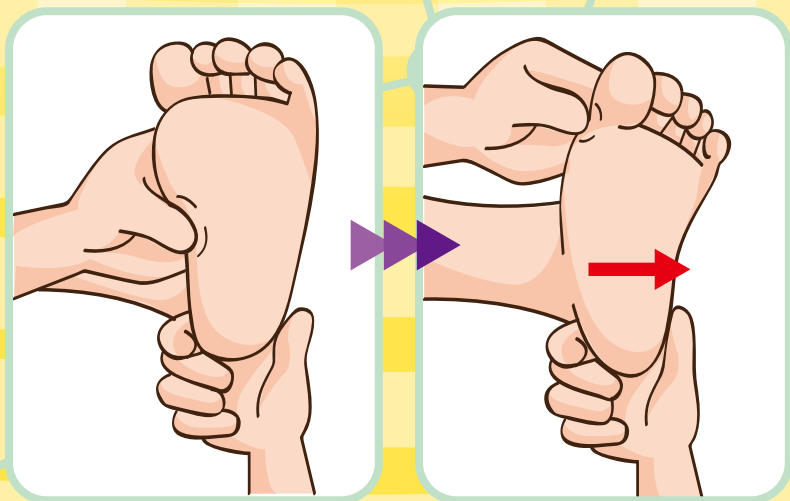


Figure 圖 20
Stretching exercise to improve forefoot adduction
改善前掌內收的伸展運動

4. Tip-toeing 腳尖走路



Figure 圖 21

Toe walking (figure 21) may occur at the early stage of learning to walk, i.e. at around age 1. It may be transient for months and subside itself if no other pathology behind. Toe walking is usually benign but clinicians need to exclude other possible neuromuscular diseases.

腳尖走路(圖21)可發生在初學走路時，即約一歲大，此現象可能只持續數個月，大部份患者腳尖走路情況都會自然消失，治療師和醫生會檢查患者會否患上其他疾病如腦性及神經系統毛病。

Management 治療方法：

A child walk with tip-toeing requires a lot of muscle work at calf. This may lead to muscle fatigue and pain. Besides, balancing will be difficult as there is only point-contact at toes instead of the whole foot.

Prolonged tip-toe walk will lead to shortening of the heel cord. Children will have difficulty in squatting. Shoe wears are easily worn out as the toecap drags on the floor.

Treatment for tip-toeing is usually by observation, stretching out the tight heel cord (figure 22 and 23) and orthotic treatment (figure 24) in severe cases.

由於患者經常以足尖走路，對小腿肌肉的需求大增，因而引致小腿肌肉疲勞及疼痛。由於身體只依靠足尖平衡，患者走過不平路面時會容易跌倒。

長期以足尖走路會使後跟縮短，患者蹲下時，後踭不能平放在地上，而由於鞋頭經常碰到地面，鞋頭很快便破損。治療足尖走路的方法會通過定期觀察，如後跟過緊，可做後跟伸展運動(圖22和23)如患者情況嚴重，可配合支架(圖24)治療矯正問題。

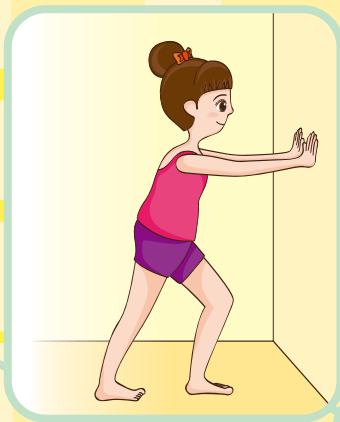


Figure 圖 22

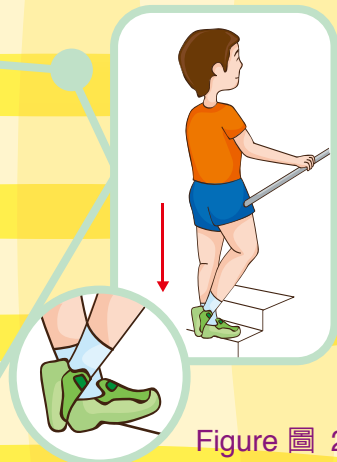


Figure 圖 23

Heel cord stretch 後跟伸展

Functional problem 功能障礙：

- **calf muscle fatigue** 小腿肌肉疲勞
- **calf pain** 小腿疼痛
- **easy falling on uneven surface** 走過不平路面時容易跌倒
- **inability to squat** 不能蹲下
- **wearing out of toecap** 鞋頭很快便磨損

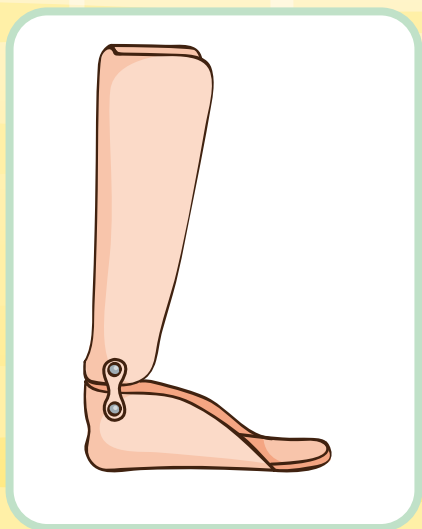


Figure 圖 24

A hinged ankle-foot-orthosis to stop planta-flexion
矯正腳尖走路的支架

Conclusion 結語：

Walking problems in children may be multi-factorial and complex. This pamphlet cannot include all problems and treatments. If there is any query, please consult a doctor or physiotherapist.

兒童的步姿問題可能是由多方面的複雜因素而引起的，本小冊子未能包括所有成因及其治療，如有任何疑問，應向醫生或物理治療師查詢。

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