Running

Clinician

Assessment 26.09.2026

Patient details

Name	
Age	10
Sex	Female
Height	157cm
Weight	53kg
Shoe size	38

SQI Performance	SQI Injury Prevention	Total Time	Cadence	Speed
100	93	00:44 min:s	174 170 - 180 steps/min	11.1 8.0 - 11.9 km/h

Summary

Patient Profile 10-year-old female patient (157 cm tall, 53 kg). No pathology was reported in the analysis.

Key Findings

- **Flight time ratio** and **contact time ratio** are abnormal. The flight time ratio was measured at 10%, which is well below the normal range (around 30%). In contrast, the contact time ratio was found to be long in both feet (39.2% left, 40.7% right). This situation leads to a **shortening of the flight phase** of the stride cycle and a **prolongation of ground contact time**.
- **Cadence** is low (2.9 steps/s). Given that the optimal cadence range is taken to be 3.2-3.5 steps/s, this value carries a risk in terms of performance and joint loading.
- **Swing time** was measured as short in both feet (left 0.416 s, right 0.409 s). This causes the stride cycle to be **completed quickly** and **ground contact to recur early**.
- **Impact force** was rated as soft in both feet (left 1000 kg·m/s², right 950 kg·m/s²). This suggests that **ground reaction force is poorly absorbed** and that **joint stress may increase**.
- **Ankle flexion angle** was recorded as neutral in both feet (left -11°, right -13.5°). This indicates that **heel strike is controlled** but that **load transfer to the forefoot may be limited**.

Conclusions

- **Low cadence and short flight time** make the stride cycle **fast and narrow**, which may lead to **repetitive loading of the joints**. In the long term, the **risk of stress fractures** increases, particularly in the knee and hip joints.
- **Long contact time** means **greater exposure to gravitational force** at every step and **overloading of the muscle-tendon system**. This may lead to microtrauma in structures such as the **Achilles tendon**

and plantar fascia.
- **Soft impact force** indicates that **ground reaction force is not being sufficiently absorbed** and that **joint stability is reduced**. This situation may give rise to chronic inflammation, particularly in the **knee and ankle joints**.

Recommendations

- Running technique training aimed at shortening stride length is recommended to increase cadence. This will increase flight time, shorten ground contact time and reduce joint loading.
- To optimise foot placement, running drills that encourage a slight forward lean and more active forefoot contact should be performed.
- Regular strengthening exercises, focusing in particular on the calf and hip stabiliser muscles, will reduce the joint stress caused by prolonged ground contact time.
- Re-analysis every 3-6 months is recommended to monitor the child's running performance and joint health.

Metrics of Interest - Flight time ratio: 10% - Contact time ratio: left 39.2%, right 40.7% - Cadence: 2.9 steps/s - Swing time: left 0.416 s, right 0.409 s - Impact force: left 1000 kg·m/s², right 950 kg·m/s² - Ankle flexion angle: left -11°, right -13.5°

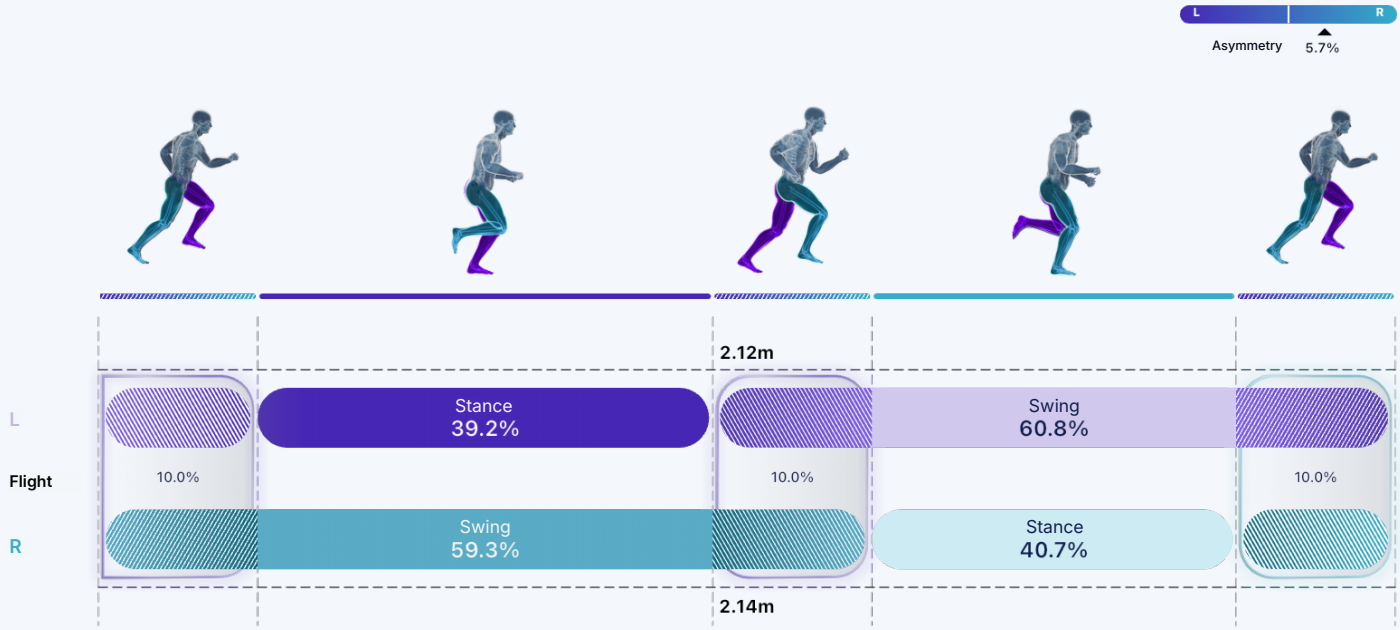
Speed / Cadence

Chart showing the progression of speed (in km/h) and cadence (in steps/min) during the run



Running Profile

Stance, swing, flight time and stride length



Running Profile AI Insights

In terms of movement efficiency and injury risk, the patient's **markedly shortened flight time ratio (10%)** and **long ground contact time in both feet** (left: 0.268 s, right: 0.281 s) indicate a low step frequency and prolonged ground contact. This may lead to **higher impact forces** and increased stress loading on the lower-limb tissues. In addition, the **short swing time in both feet** (left: 0.416 s, right: 0.409 s) points to a shorter stride length and reduced movement efficiency. These findings call for kinematic interventions to be considered in order to increase step frequency and optimise ground contact time.

Asymmetry

The difference in stance time between the two feet, shown as the percentage distribution on each foot. A slight asymmetry (<3%) is natural



Strike type

Strike type: heel or forefoot



Asymmetry AI Insights

Strike Type AI Insights

Key Findings and Clinical Significance: During running, excessive supination and an excessive inversion of -63° in midfoot-heel orientation were detected in the left foot. This indicates that the left ankle is at high risk. In addition, the left foot showed a tendency to remain in more supination than normal during the transition from heel strike to toe-off. These findings point to an increased injury risk in the left foot. In the right foot, a midfoot strike and a more symmetrical transition pattern were observed. The strike type was recorded as midfoot on the right and heel strike on the left.

Key findings and clinical significance: The patient's running analysis showed a **heel strike (heel-first contact)** pattern in both feet. The **neutral** ankle flexion angle on both sides **(-11° and -13.5°)** at heel strike may increase the load on the ankle and lower limb. This may raise stress in the heel region and at the knee joint, especially during long-distance running. The heel strike pattern and neutral ankle flexion may reduce running efficiency and increase injury risk. These findings can be improved with fine adjustments to footwear choice and running technique.

Push-off Speed

L



Very High

R



High

Maximum step height

L



25.0cm

R



16.0cm

Push-off Speed AI Insights

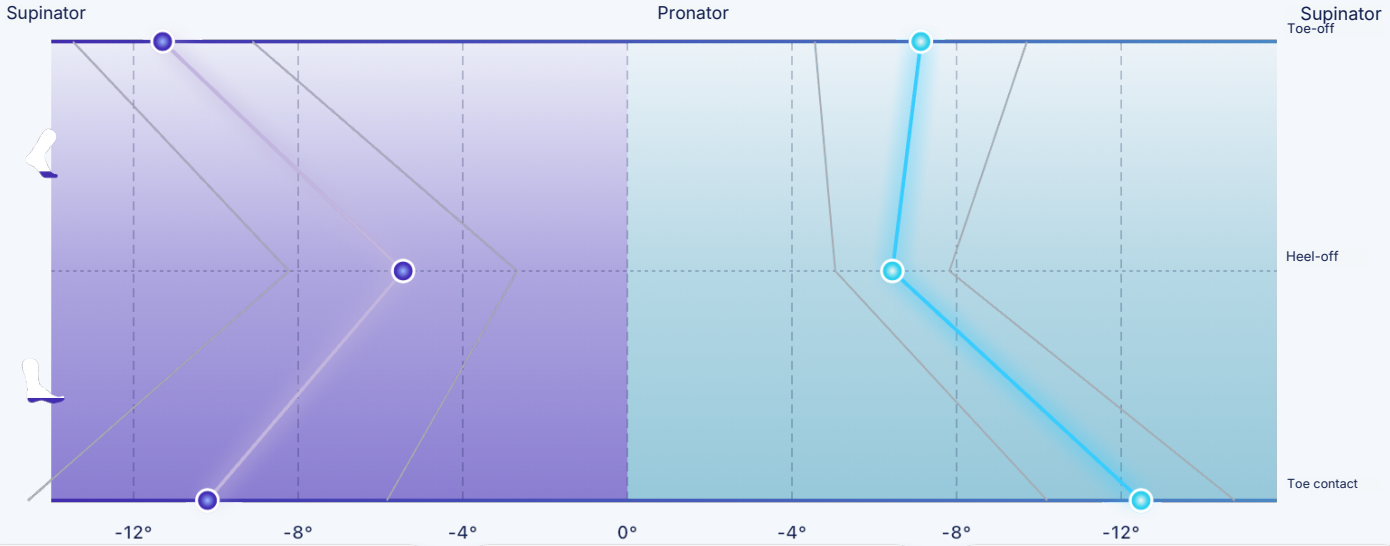
Maximum step height AI Insights

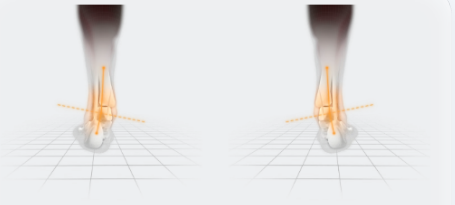
During **propulsion**, the patient shows increased ankle angular velocity in both feet (*left: 723.2 deg/s, right: 666.2 deg/s*). This may overload the plantar flexors (triceps surae) and reduce joint stability in the push-off phase. Particularly in a young patient, it is important to regard this pattern as a risk factor for repetitive stress injuries (e.g. Achilles tendinopathy, metatarsal stress fractures). Strengthening the ankle and lower-leg muscles and maintaining their flexibility is recommended.

The patient shows a marked left-right asymmetry in **maximum foot height above the ground**: an average of 0.25 m in the left foot versus a very low 0.16 m in the right. This points to **insufficient foot clearance during the swing phase** in the right leg and a potentially **increased risk of tripping**. The asymmetry may also reflect a lower-limb strength imbalance or differences in motor control.

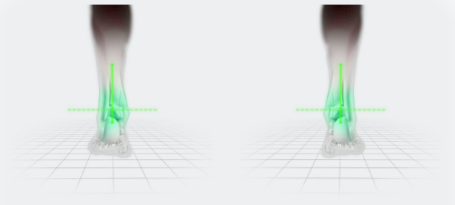
Pronation/Supination angles

Provides the pronation/supination angles at 3 points of the contact phase: strike, mid-stance, push-off.

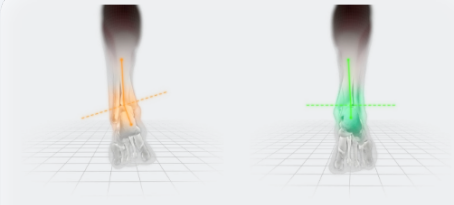




Landing



Transition



Push-off

Pronation/Supination Angles AI Insights

A mildly inward-rolled (mild pronation) onset at heel strike is observed in both feet, which can be regarded as a physiological adaptation supporting shock absorption. In the mid-contact and push-off phases, a stable movement pattern close to neutral is seen in both feet. In the transition from heel strike to push-off, ankle and foot stability appear to be maintained in a controlled manner, which may help preserve ankle stability during long-distance running.

Comments