

Fig. E-1

Sagittal kinematic traces of the knee and ankle of a ten-year-old boy with asymmetric spastic diplegia. At Time 1, there is asymmetric equinus (worse on the left side compared with the right), with asymmetric equinus contractures confirmed on examination with the patient under anesthesia. The modified Strayer procedure (distal gastrocnemius recession with soleal fascial lengthening) was performed on the left side, and a Strayer gastrocnemius recession was performed on the right. At Time 2, both ankle kinematics showed substantial improvement. However, first rocker was not present on either side and there was mild residual equinus in late stance. At Time 3, first rocker was present bilaterally and the ankle traces were within normal limits. This boy had surgery at proximal levels, including medial hamstring lengthening with transfer of the rectus femoris to the semitendinosus to manage dynamic knee dysfunction. The grey band is the laboratory normal range, the continuous black line is the subject's left side, and the dotted line is the subject's right side.

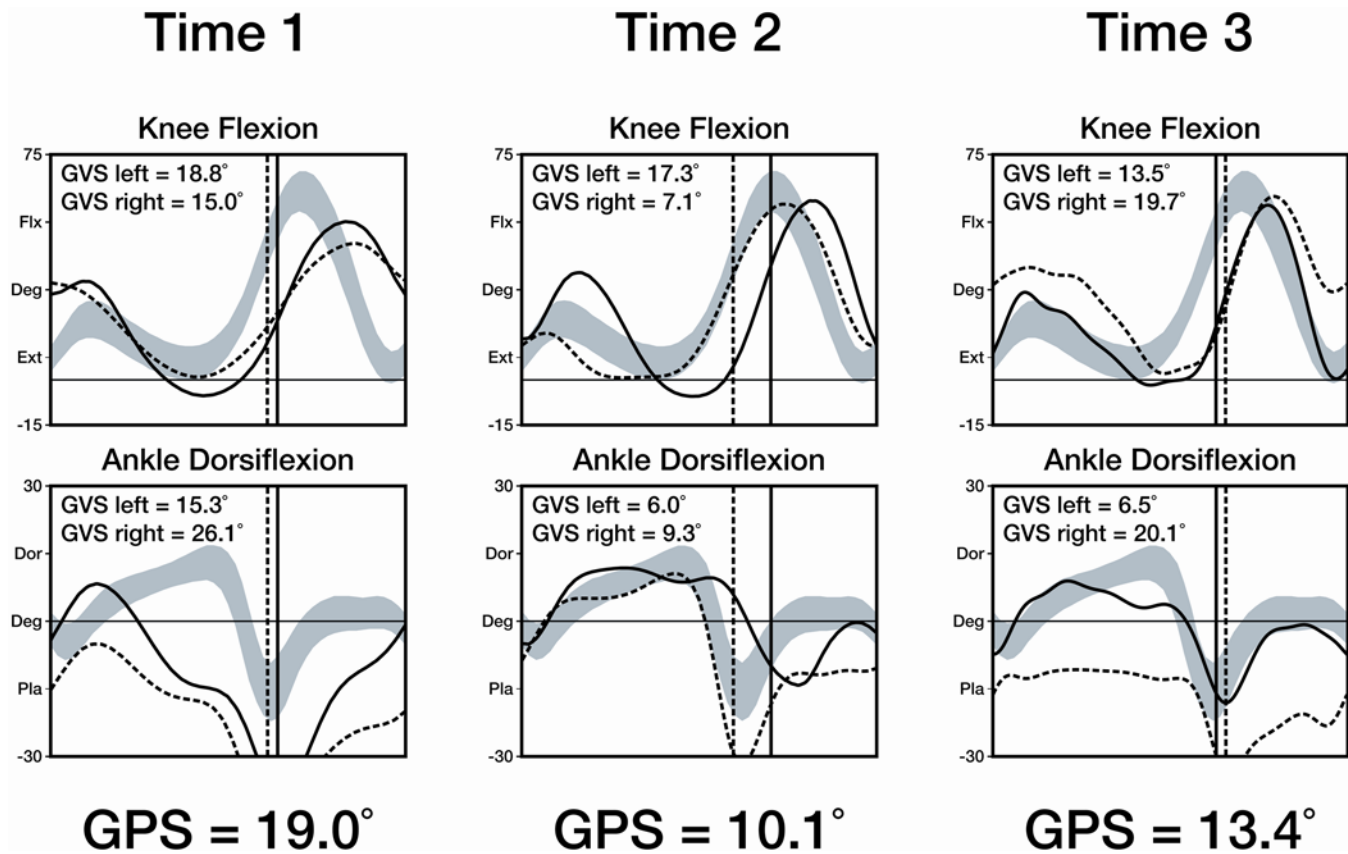


Fig. E-2

Sagittal kinematic traces of the knee and ankle of a twelve-year-old girl who had severe bilateral equinus at Time 1, marked improvements at Time 2, and relapse at Time 3. The GVS and GPS at Time 2 showed deterioration by Time 3, at nine years after the index surgery. The grey band is the laboratory normal range, the continuous black line is the subject's left side, and the dotted line is the subject's right side.

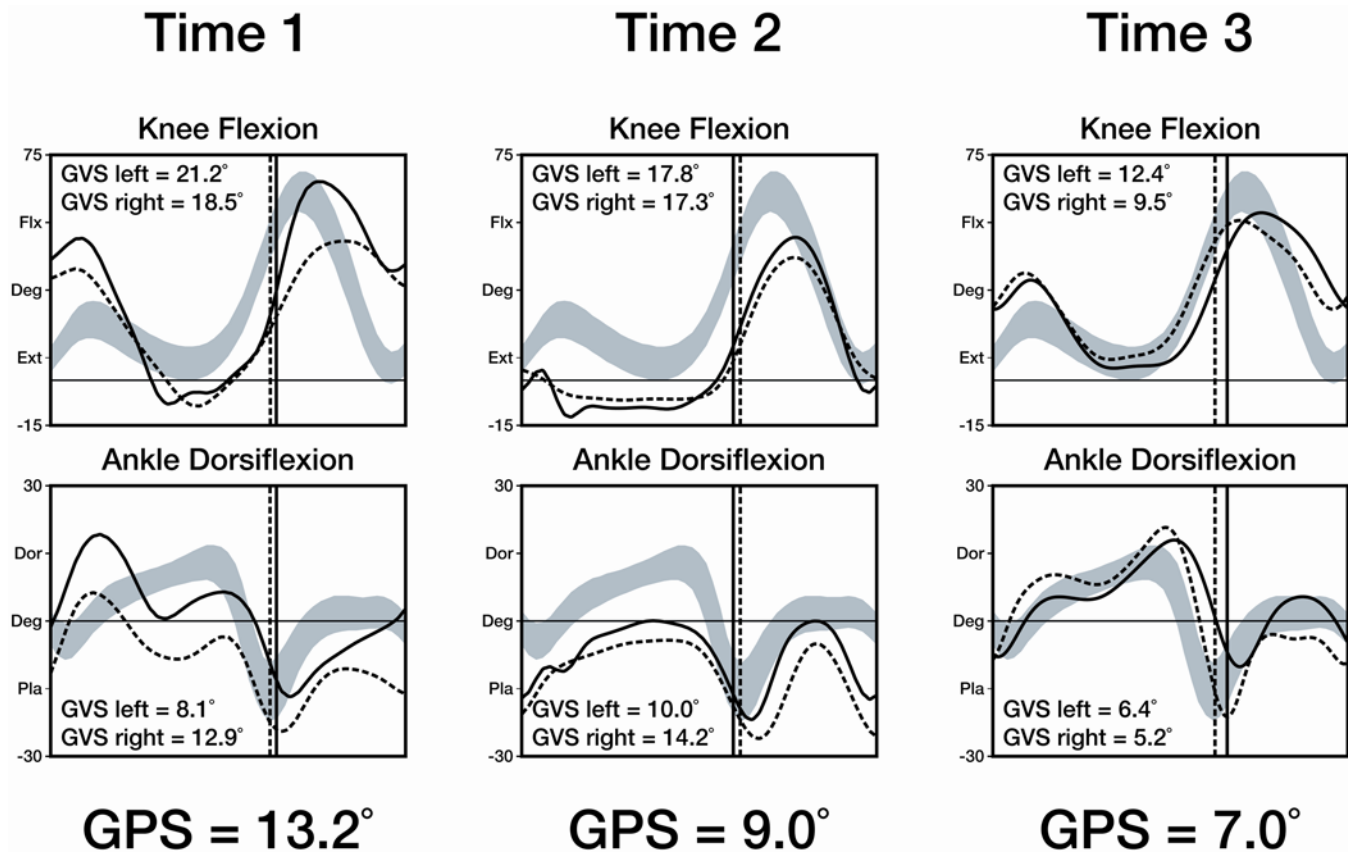


Fig. E-3

Sagittal kinematic traces of the knee and ankle of a ten-year-old boy who had asymmetric equinus gait with recurvatum at the knee in late stance. At Time 2, the slope of the second rocker had improved, but both ankles were in substantial equinus and both knees were in substantial recurvatum, after a combination of bilateral Strayer calf lengthening and bilateral medial hamstring lengthening. After the gait analysis at Time 2, injections of Botox were given to both gastrocnemius-soleus complex muscles, use of hinged ankle-foot orthoses was continued, and a strengthening program was prescribed. By Time 3, six years later, both dynamic knee function and dynamic ankle function had improved substantially, without additional surgery. The grey band is the laboratory normal range, the continuous black line is the subject's left side, and the dotted line is the subject's right side.

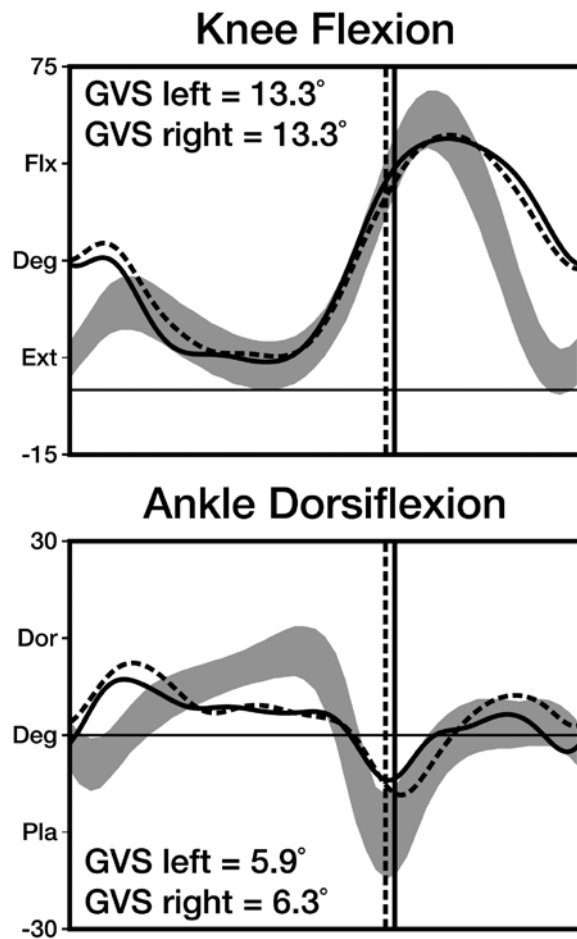


Fig. E-4

Sagittal ankle and knee kinematics of an eighteen-year-old man with symmetric diplegia, eight years after single-event multilevel surgery that included bilateral Strayer gastrocnemius recessions. At the time of final follow-up, the patient functioned at GMFCS level II, chose not to wear ankle-foot orthoses, and worked on a farm as a manual laborer. He had substantial weakness and impaired selective motor control. The sagittal ankle kinematics show an absence of the first rocker, an early peak of dorsiflexion (coincident with excessive knee flexion), and a reversal of the second rocker into the equinus range during late stance. This contributed to strong coupling at the knee, and he was noted to have a normal range of knee extension in mid-to-late stance. However, according to the strict criteria of this study, he had recurrent equinus, as the sagittal ankle kinematics were more than two standard deviations below the normal mean in late stance. The grey band is the laboratory normal range, the continuous black line is the subject's left side, and the dotted line is the subject's right side.

TABLE E-1 Comparison of Gait Profile Scores (GPS) and Gait Variable Scores (GVS) Between Times 1 and 2, Times 1 and 3, and Times 2 and 3

Comparison	Mean Difference	95% Confidence Interval	P Value	Subjects with Lower Score (%)
GPS (<i>deg</i>)				
Time 1/Time 2	-5.9	-7.1, -4.6	<0.005*	87.5
Time 1/Time 3	-6.6	-7.8, -5.4	<0.005*	100
Time 2/Time 3	-0.7	-1.6, 0.1	0.1	50
GVS				
Sagittal pelvis (<i>deg</i>)				
Time 1/Time 2	-0.3	-2.2, 1.6	0.76	55
Time 1/Time 3	-0.9	-3.5, 1.8	0.51	60
Time 2/Time 3	-0.6	-2.6, 1.4	0.55	53
Sagittal hip (<i>deg</i>)				
Time 1/Time 2	-3.1	-5.1, -1	0.004*	69
Time 1/Time 3	-2.8	-5.2, -0.4	0.02*	72
Time 2/Time 3	0.3	-1.7, 2.4	0.74	53
Sagittal knee (<i>deg</i>)				
Time 1/Time 2	-6.7	-8.8, -4.7	<0.005*	85
Time 1/Time 3	-7.4	-9.3, -5.4	<0.005*	91
Time 2/Time 3	-0.7	-1.7, 0.4	0.21	51
Sagittal ankle (<i>deg</i>)				
Time 1/Time 2	-9.9	-13.1, -6.7	<0.005*	81
Time 1/Time 3	-10.7	-13.4, -8	<0.005*	92
Time 2/Time 3	-0.9	-1.9, 0.1	0.09	58
Coronal pelvis (<i>deg</i>)				
Time 1/Time 2	-1.1	-1.7, -0.4	0.001*	73
Time 1/Time 3	-0.9	-1.6, -0.2	0.009*	66
Time 2/Time 3	0.1	-0.4, 0.7	0.62	41
Coronal hip (<i>deg</i>)				
Time 1/Time 2	-0.1	-1, 0.8	0.88	55
Time 1/Time 3	-0.7	-1.6, 0.2	0.15	60
Time 2/Time 3	-0.7	-1.4, 0.1	0.09	54
Transverse pelvis (<i>deg</i>)				
Time 1/Time 2	0.2	-1.4, 1.8	0.8	51
Time 1/Time 3	-0.6	-1.9, 0.6	0.32	60

Time 2/Time 3	-0.7	-1.7, 0.3	0.18	51
Transverse hip (<i>deg</i>)				
Time 1/Time 2	-4.4	-6.2, -2.7	<0.005*	64
Time 1/Time 3	-4.2	-6.3, -2.2	<0.005*	65
Time 2/Time 3	0.2	-1.9, 2.2	0.87	49
Transverse foot progression (<i>deg</i>)				
Time 1/Time 2	-11.9	-16.2, -7.6	<0.005*	77
Time 1/Time 3	-13.6	-16.9, -10.3	<0.005*	89
Time 2/Time 3	-1.8	-4, 0.4	0.11	55
Ankle moment (<i>Nm/kg</i>)				
Time 1/Time 2	-0.19	-0.24, -0.14	<0.005*	55
Time 1/Time 3	-0.16	-0.2, -0.13	<0.005*	61
Time 2/Time 3	0.02	-0.02, 0.07	0.35	27
Ankle power (<i>W/kg</i>)				
Time 1/Time 2	-0.33	-0.48, -0.18	<0.005*	50
Time 1/Time 3	-0.32	-0.45, -0.19	<0.005*	53
Time 2/Time 3	0.02	-0.06, 0.1	0.595	24

*Significant.