Artificial Intelligence Versus Conventional orthosis

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We've witnessed remarkable development in the domains of robotics and artificial intelligence during the previous decade. Innovators have been looking for methods to merge people and robots, and in certain cases, to eliminate humans entirely. We're seeing delivery drones, security robots, and other robotics applications. Chatbots, self-driving cars, and speech recognition have all made important advances in AI. Perhaps most importantly, advancements in artificial intelligence and robotic technology in health care are boosting patient treatment and care. Physical therapy is one field that is making use of both technologies, with a special emphasis on those who have movement difficulties as a result of neurological damage.

Keywords: Artificial Intelligence, conventional orthosis.

INTRODUCTION

Today, some inventions are updated versions of fundamental inventions that make our lives more comfortable and convenient. They are derived from fundamental or simple inventions that have accumulated through time. Man's imaginative intellect has produced and developed items that have transformed the world from caveman to contemporary man. Today, we can't fathom a world without these amazing innovations becoming a reality. Our lives are changing every year, and we are still waiting for anything new to happen. Orthosis is an orthopedic apparatus used to support, align, prevent or correct the deformities or to improve the function of parts of the body. Its purpose is to lend stability to a weak joint, correct or maintain the alignment, correct skeletal deformities etc. Orthosis originated around 2500 BC. It was a very important invention. In 19th CE more innovative orthosis were made which made a huge change in the lives of the people suffering from spinal cord injuries, poliomyelitis, multiple sclerosis, stroke, cerebral palsy etc. The industrial revolution brought with it a slew of technical advances and ways for generating massive amounts of energy, increasing the amount of work that could be done by human and animal labour. (1)

Artificial Intelligence (AI):

The term AI refers to a computer's ability to do activities that would typically need human intellect - in other words, computers that can 'think.' Machine learning (ML) is a branch of research that enables computers to learn without being explicitly programmed. This enables them to recognize patterns in data in order to categorize and forecast it. AI systems that 'think' and 'learn' like humans are still a long way off, but they may be used to help with healthcare data processing. Humans are excellent at detecting patterns. As a physiotherapist, this is critical for developing clinical reasoning abilities. However, when we begin to analyze bigger data sets, such as at the population level, we require assistance. Computing advancements, lower cost electronic data storage alternatives, and a better understanding of the power of data science now allow pattern recognition at a level far beyond human ability. AI is a technology that humans can utilise to improve health care. However, AI cannot function in isolation. Humans offer the context needed to extend AI into the real world scenarios. AI will only improve healthcare if it is viewed through a human lens, and the future healthcare environment can only thrive if it is approached jointly. AI is being used in musculoskeletal radiography, skeletal trauma, orthopedic surgery, physical and rehabilitation medicine and sports medicine, as well as "big data" and AI in GI endoscopy related injuries.(3-15)
Conventional orthosis:

Orthoses are called by the joints they include and the motions they govern. Foot orthoses (FOs) are devices that are worn on the foot and are worn inside or outside of shoes. Ankle foot orthoses (AFOs) are devices that go over a shoe and end below the knee. From the shoe to the thigh, the knee–ankle–foot orthosis (KAFO) is worn. A hip knee ankle foot orthosis (HKAFO) is a kind of KAFO that includes a pelvic band that wraps that encompasses the torso and lower limbs.

A trunk–hip–knee–ankle–foot orthosis (THKAFO) is a brace that encompasses the torso and lower limbs.

Knee orthoses (KO) and hip orthoses (HO) protect the knee and hip joints, respectively. Cervical orthoses surround the neck. Most trunk orthoses are called after the motions they govern, however scoliosis orthoses are frequently named after the city where they were invented. A spinal brace or orthosis is a mechanical device that provides support to the spinal column. It is beneficial in relieving back discomfort. Low back pain syndrome affects roughly 80% of all people at some point in their lives. According to research, 70% of victims recovered after one month, 26% recovered within three months, and just 4% remained afflicted for more than six months (Rene Cailliet, 1981). However, comprehensive knowledge of functional anatomy is required to comprehend any type of musculoskeletal discomfort.

Artificial Intelligence (AI) orthosis:

The influence of AI-based technologies in clinical practice and the implications for physiotherapy education in order to graduate professionals ready for practice in a 21st-century health system.(16-25) For example: 1) PhysiApp is an iPad and iPhone software developed by the worldwide business Physitrack that records patient exercise performance, adherence, and results. It also includes anatomical pictures and 3D graphics from Primal Pictures. According to the Physitrack website, the software is used by approximately 1 million patients worldwide each year in more than 100 countries. SWORD Health is a Portuguese business that develops a "system for home-based physical rehabilitation (SWORD)." Wireless motion trackers are attached to body of the patient as part of the system. A "digital therapist" provides real-time input, such as "lift your leg higher." 2) SWORD incorporates a web-based platform via which distant healthcare teams may examine patient data analysis and utilize this information to monitor and alter the rehabilitation program. In a recent study of two groups of patients recovering from knee injuries, the SWORD group had Timed Up and Go scores that were half as long as the standard physical therapy group. Artificial Intelligence enabled robots is also gaining popularity in the physical therapy area. 3) Bionik Labs develops mechanical rehabilitation devices that operate with the hands, wrists, and arms, encouraging the patient to do the right movement and assisting when needed. Robotic treatment systems process large amounts of data, becoming "smarter" as they understand the capabilities of the patient. A treatment robot can detect even the smallest amount of change and can offer quantifiable data on gradual improvements. As the patient's strength and abilities improve, the robot gives less help, allowing the patient to walk more confidently. These mechanical physical therapists can collaborate with humans: the robots assist the patient in fine-tuning each movement, while the therapists assist the patient in translating these advances into increased function. Finally, research has found that robotic gait devices offer advantages in SCI therapy. In the near future, devices are anticipated to be used not just during therapy but also in everyday activities. However, the devices should be hybrid, combining current SCI people' abilities and supporting them where and when their skills are inadequate, as well as including feedback mechanisms to maximize the user benefit from the item.(26-32)

Conclusion:

Both AI and conventional orthosis have their advantages and disadvantages. Artificially intelligent technologies are pushing changes in the health system that will have far-reaching implications for how health care is delivered in the twenty-first century. These disruptive shifts will push all healthcare professions to reconsider their suitability in an intelligence era characterized by smart devices, large data sets of immense complexity, and radically altered connections with patients and algorithms. We would be sensible to focus our efforts on preparing physiotherapy education and clinical practise for a very different future, one in which we learn to excel at things that are difficult for machines to duplicate. In an intelligent era, human connection will be vital to success, and we must use every opportunity to strengthen our abilities to care for one another, learn successfully throughout our lives, and create imaginative solutions to the problems that matter to us. (3) Knee braces and foot orthoses can help with pain, joint stiffness, and medicine dose. In participants with varus and valgus knee osteoarthritis, they also increase proprioception, balance and physical function scores. Knee braces and foot orthoses should be used with caution as a conservative treatment option for relieving pain and stiffness and improving physical function in those with knee osteoarthritis.(4) Exercise and foot orthoses can both relieve discomfort, but neither can restore foot posture. Exercise, either
alone or in combination with foot orthoses, had a greater effect on adult flatfoot than only wearing foot orthoses. Active intervention was proven to be more effective than passive intervention in lowering pain.(5) Individuals suffering from knee osteoarthritis (OA) might benefit from a knee brace or a foot/ankle orthosis. The primary goal of these aids is to alleviate pain, enhance physical function, and maybe halt disease progression.(7)

Individuals with patellofemoral pain may benefit from foot orthoses if they also have symptoms of excessive foot pronation and/or a lower-extremity alignment profile that includes excessive lower-extremity internal rotation during weight bearing and an increased Q angle, according to clinical evidence. Foot orthoses may be a useful adjunct to other therapeutic options for patients with the previously stated structural alignment profile.(8)

Future scope and implications:

It’s on us human to decide which method we use for our benefits. As we know Artificial intelligence technologies cannot be available for all of us right now due to high cost and availability of fewer resources in India. Maybe in future it will be available for all at lower cost. But nonetheless artificial intelligence has very bright future and will be a huge part of our lives in near future.

REFERENCES


