Autism spectrum disorder

Autism spectrum disorder (ASD) is a set of developmental disorders characterized by lack of social interaction, verbal and non-verbal communication in the first 3 years of life. It is also associated with several co-morbidities, including epilepsy, aggression, self-mutilating behaviour and obsessive-compulsive behaviour. In some cases this can turn in to obsessive-compulsive disorder (OCD). Nucleus accumbens (NAc) plays a key role in reward circuitry and is also involved in the control of OCD and aggression.

Converging evidence indicates that brain abnormalities in autism spectrum disorder (ASD) involve atypical network connectivity, but it is unclear whether altered connectivity is especially prominent in brain networks that participate in social cognition.

Several non-specialist mediated interventions have been developed and tested to address problematic symptoms associated with autism. These can be implemented with a fraction of cost required for specialist delivered interventions. This review represents a robust evidence of clinical effectiveness of these interventions in improving the social, motor and communication deficits among children with autism.

An electronic search was conducted in eight academic databases from their inception to 31st December 2018. A total of 31 randomized controlled trials were published post-2010 while only 2 were published prior to it. Outcomes pertaining to communication, social skills and caregiver-child relationship were meta-analyzed when reported in > 2 studies.

A significant improvement was noted in child distress (SMD = 0.55), communication (SMD = 0.23), expressive language (SMD = 0.47), joint engagement (SMD = 0.63), motor skills (SMD = 0.25), parental distress (SMD = 0.33) parental self-efficacy (SMD = 0.42) parent-child relationship (SMD = 0.67) repetitive behaviors (SMD = 0.33), self-regulation (SMD = 0.54), social skills (SMD = 0.53) symptom severity (SMD = 0.44) and visual reception (SMD = 0.29).

Non-specialist mediated interventions for autism spectrum disorder demonstrate effectiveness across a range of outcomes for children with autism and their caregivers [1)]

A 42-year-old Autistic lady suffering from OCD and aggression was offered Nucleus accumbens deep brain stimulation (NAc DBS) for her comorbidities of OCD and aggression. NAc was targeted using standard stereotactic methods and the postoperative scans confirmed the position of the active electrode to be within the NAc. The patient had a significant relief of her symptoms. At one-year follow-up the Yale-Brown obsessive-compulsive scale (YBOCS) score for OCD, excluding the item 1-5 of YBOCS, improved from 19 to 5. Her Hamilton depression and anxiety scores similarly improved from 20 to 15 and from 30 to 18. Social communication questionnaire - current for autism score improved from 26 to16, the subscores for reciprocal social interaction improved from 13 to 8, for the communication from 5 to 4 and for the restricted, repetitive and stereotyped patterns of behaviour 6 to 3.

This case reports illustrates the role of NAc in OCD and aggression in an autistic patient [2)].

Patients with symptomatic Chiari malformation Type I (CM-I) frequently present with headaches, neck pain, dysphagia, and balance disturbances. In children with autism spectrum disorder (ASD), diagnosing CM-I can be a challenging task. Moreover, even if symptomatic, some patients do not undergo further evaluation or management, as their presentations are attributed to autism and its myriad symptoms. Therefore, cranial MRI findings were reviewed after evaluating and treating patients with coexisting ASD and CM-I. In this paper, the authors report on 5 children with ASD and symptomatic CM-I, including their clinical presentation, imaging studies, management, and outcomes, and discuss the likely underrecognized coexistence of these conditions. METHODS All pediatric patients with ASD and cranial MRI conducted for any reason in the period from 1999 to 2013 were considered for analysis. All cases with concomitant symptomatic CM-I were eligible for this retrospective analysis. RESULTS One hundred twenty-five pediatric patients diagnosed with ASD had undergone MRI, and 9 of them had evidence of cerebellar tonsillar herniation. Five patients were symptomatic and underwent suboccipital craniectomy, a C-1 or a C-1 and C-2 laminectomy, and duraplasty with bovine pericardium or Type I collagen allograft. There were no intraoperative complications. All patients showed symptom improvement and/or resolution of presenting symptoms, which included headache, dysphasia, speech, and irritability. CONCLUSIONS There is no identified cause of autism. Children with ASD can be difficult to assess specifically in a neurological examination. Thus, cranial MRI considered when completing a comprehensive diagnostic evaluation. While cranial MRI is not a routine part of ASD evaluation, this study demonstrates that CM-I and ASD may coexist and be underrecognized. The study reinforces the importance of a comprehensive medical evaluation designed to elucidate neurological findings in children with impaired communication abilities and suggests the judicious use of neuroimaging [3)].

Treatment

Until now, the treatment of patients with autism spectrum disorder (ASD) remain a difficult problem. The insula is involved in empathy and sensorimotor integration, which are often impaired in individuals with ASD. Deep brain stimulation, modulating neuronal activity in specific brain circuits, has recently been considered as a promising intervention for neuropsychiatric disorders. Valproic acid (VPA) is a potential teratogenic agent, and prenatal exposure can cause autism-like symptoms including repetitive behaviors and defective sociability. Herein, we investigated the effects of continuous high-frequency deep brain stimulation in the anterior insula of rats exposed to VPA and explored cognitive functions, behavior, and molecular proteins connected to autism spectrum disorder.

VPA-exposed offspring were bilaterally implanted with electrodes in the anterior insula (Day 0) with a recovery period of 1 week. (Day 0-7). High-frequency deep brain stimulation was applied from days 11 to 29. Three behavioral tests, including three-chamber social interaction test, were performed on days 7, 13, 18, 25 and 36, and several rats were used for analysis of immediate early genes and proteomic after deep brain stimulation intervention. Meanwhile, animals were subjected to a 20 day spatial learning and cognitive rigidity test using IntelliCage on day 11.

Results: Deep brain stimulation improved the sociability and social novelty preference at day 18 prior to those at day 13, and the improvement has reached the upper limit compared to day 25. As for repetitive/stereotypic-like behavior, self- grooming time were reduced at day 18 and reached the upper limit, and the numbers of burried marbles were reduced at day 13 prior to those at day 18 and day 25. The improvements of sociability and social novelty preference were persistent after the

stimulation had ceased. Spatial learning ability and cognitive rigidity were unaffected. We identified 35 proteins in the anterior insula, some of which were intimately linked to autism, and their expression levels were reversed upon administration of deep brain stimulation.

Conclusions: Autism-like behavior was ameliorated and autism-related proteins were reversed in the insula by deep brain stimulation intervention, these findings reveal that the insula may be a potential target for DBS in the treatment of autism, which provide a theoretical basis for its clinical application., although future studies are still warranted [4].

1)
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