Buprenorphine patches: impact on cognitive functions in Down’s syndrome

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Opioids have been regarded as among the most effective medications for the treatment of acute, chronic severe pain and cancer pain. However, the long-term administration of opioids continues to be controversial. There are concerns surrounding misuse, abuse and addiction.1 Dr Javaid et al report of a case of a woman with Down’s syndrome and severe learning disability presenting with symptoms of dementia, due to the possible likelihood of prolonged use of buprenorphine patches, over the five years. These findings highlight the need for regular medication reviews for individuals with learning disabilities.

The continuous use of opioids over a prolonged time has been found to enhance the negative emotional symptoms related to abstinence. This may result in profound dysphoria, irritability, sleep disturbances, anxiety and emotional pain.2 Buprenorphine can be administered through transdermal routes often used with individuals with learning disabilities. This method increases the likelihood of adherence with the application of a ‘pain patch’. Shurman and Koob3 report that in the misuse of opioids, positive emotional states (brain reward systems) mediated by the neural substrates are mostly compromised, and substrates mediating negative emotional states (brain stress systems) are enhanced. An early marker of this non-homeostatic state may be the development of opioid-induced emhyperkatifeia, which the authors define as the increased intensity of negative emotions. Sjogren, Thomsen and Olsen3 studied 40 patients treated with regular and stable doses of an oral opioid; attention, psychomotor speed, and working memory were significantly impaired in those patients using opioids. Similarly, Schiltenwolf and Afbar4 report that opioid therapy in patients with chronic low back pain has a negative effect on cognitive functioning. The study found that visual attention, information processing, graphomotor speed (writing speed), visual scanning ability and numeric sequencing ability were impaired in patients undergoing opioid therapy in comparison with healthy controls. Working memory and cognitive flexibility of patients who underwent opioid therapy were significantly hindered. Finally, Ito and Kanemoto5 reported a case of an 82-year-old woman who was referred to psychiatry because of severe behavioural problems. The authors concluded that her sudden cognitive decline and mental distress were due to the introduction of buprenorphine patches.

Case presentation
The patient was a 51-year-old woman with Down’s syndrome who was supported within the community in supported living accommodation. She was referred to the Down’s syndrome dementia clinic in March 2017 by her community learning disability nurse due to concerns about her memory, loss of skills, unusual behaviours and confusion.

Presentation in clinic
Following the baseline psychological assessment, the patient was seen within the Down’s syndrome and dementia clinic for an initial appointment on 30 October 2017. The team took background information, the recent informant assessments were discussed and medication reviewed. At this stage, it was discovered that the patient had been prescribed buprenorphine patches since 2013 due to possible chest pain from acid reflux and toothache. This had never been reviewed until the patient came to the dementia clinic in 2017. Care staff were unable to give a clear indication as to why the patches were prescribed. There was particular concern about the psychological and physical dependence associated with long-term use of buprenorphine patches. Specifically, that there is an increased risk of serious side-effects from long-term use of pain patches. It was also reported in the assessment that the patient was absolutely fine with regards to her cognitive abilities prior the prescription of buprenorphine patches in 2013.
There was gradual deterioration of her cognitive functions, including memory, after three years of using these patches.

**Baseline psychological assessment**

Due to the severity of the patient’s learning disability direct neuropsychological assessments could not be completed. Therefore, carers completed the informant interview assessments as part of the dementia clinic assessment process. The informant measures have been designed for use in dementia assessment for people with a learning disability.

The Dementia Scale for Down Syndrome (DSDS) gives a measure of early, middle and late stages of dementia and includes the timescale of the deterioration. The Dementia Questionnaire for People with Learning Disabilities (DLD) is a screening tool for the early detection of dementia in adults with learning disabilities, consisting of 50 items. There are eight subscales: short-term memory; long-term memory; orientation (comprising the Sum of Cognitive Scores); speech; practical skills; mood; activities and interest, and behavioural disturbance (comprising the Sum of Social Scores). The Adaptive Behaviour Dementia Questionnaire (ABDQ) is a screening questionnaire for Alzheimer’s disease.

The following signs and symptoms of dementia had emerged since December 2016 and were reported by the patient’s carers:

**Memory:** The patient began to forget what she was doing partway through familiar routines. With regards to personal care, she formally was independent and maintained good hygiene. However, the patient was unsure what to do with a toothbrush and when washing her hands she would tap her hands on the taps rather than wash her hands. Also, she began to lose or misplace objects of value to her, such as her ball and medal.

**Orientation:** The patient began to find it difficult to follow verbal directions. This had been noticed when asking her to sit at the table, where she now needs much more encouragement and prompts. She began to find it difficult to orientate herself around her home. The patient had been wandering during the day and night without a purpose and appeared to be confused about where she was.

**Activity and interest:** The patient began to less frequently seek out ways to occupy herself, became unwilling to do familiar activities and began to sleep during the day, which led to increased periods of inactivity. For example, she used to spontaneously get up and interact with her ball, throw it to staff and take it everywhere with her. However, she was no longer interested in her ball, her medal and her slippers. The patient no longer enjoyed arts, crafts, drawing or jigsaws that she had previously.

**Mood:** The patient became characteristically more anxious and upset, which was observed through an increase in loud vocalisations. The triggers for this anxiety tended to be when she was out in the community, when walking on different textured/coloured floors, stepping down from curbs, getting in and out of a taxi/car/minibus.

**Behavioural disturbance:** The patient became increasingly uncooperative and physically and vocally disruptive. She began to express her frustration by nipping and scratching staff. This tended to be when she was attending medical appointments or utilising the stairs. She used to enjoy her hair being blow dried by the staff and she would be given a hairbrush to join in with this activity. However, she began to try to dig the hairbrush into her scalp or hit her forehead with the hairbrush. Therefore, staff now do not give her a hairbrush while styling her hair due to the risk of self-injurious behaviour.

**Practical skills:** Staff noticed a deterioration in the patient’s daily living skills. She would drop what was on her spoon or store food in her mouth. The patient used to dress independently. However, recently when given socks, she put them on her hands as gloves, a hat on top of her boots and she does not pull her trousers back up after using the toilet as she used to.

**Physical Health:** The patient began to have occasions of incontinence, due to struggling to orientate her to the bathroom. Staff began to notice a general slowing of her movements. She began to experience seizure activity, which led to a hospital admission and the consultant neurologist prescribing her anti-convulsant medication.

According to the information gathered on the DSDS, as of October 2017 she was presenting with a cognitive profile consistent with an individual with mid-stage dementia. The ABDQ was below the cut-off criteria for consideration of dementia.

**Outcome**

After having various discussions with the professionals in the acute hospital and the GP, buprenorphine patches were successfully stopped in 2018. The patient is now more alert and orientated. She has been functioning alright with support from staff as compared with when she was on these patches. Her memory is now more stable with no further decline. This has been confirmed in the neurocognitive assessments. Her quality of life has been improved drastically.
Discussion
In the present case, the results show that the patient was showing signs and symptoms of mid-stage dementia. The physical health investigations of a full blood test and urine test did not reveal any common causes for her presentation. There was no reported family history of dementia. While all other plausible causes were excluded, it seems that the long-term use of opioids over a four year period may have contributed to the patient’s cognitive impairment or worsening of the symptoms of dementia.

According to the British National Formulary, the confusion, drowsiness (sleeping during the day), euphoria (exaggerated arm movements), mood changes, sleep disturbances and visual disturbances (distorted depth perception) that the patient was experiencing correlated with the common side-effects of the long-term use of buprenorphine patches. Due to side-effects like sedation, personality changes and confusion, very careful consideration should be given when prescribing opioid pain relief to people with a high risk of having dementia or in cognitive impairment. It can cause worsening in the presentation of dementia. It is worth mentioning that in one of the studies conducted a few years back, patients receiving heroin performed significantly worse than healthy controls in most domains.

In subtests measuring psychomotor performance, patients receiving opioids performed worse than patients in other treatment groups. The study also provided some preliminary evidence that cognitive functions may be more impaired in patients taking opioids as compared with healthy controls.

The follow-up to this report would be to conduct a case series, and observe the influence of buprenorphine patches on cognitive functions in dementia.

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Declaration of interests
No conflict of interests were declared.

References