Tourette syndrome and co-morbidity

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Outline of presentation

- Research project Herlev University Hospital Denmark
- Prevalence of co-morbidities
- Impact
- Aetiology
- Course of symptoms
- Treatment
- Conclusion
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Cohort

- Diagnosis TS on September 1, 2005 (N=376)
- Participation rate: 83.5 % (N=314)
- Mean age: 12.4 years (5.3-20.0)
- 81.9 % boys
Cohort

- Healthy controls
  - Classmates from 24 schools
  - N=81
  - Mean age: 13.0 years (10.1-19.3)
  - 65.0 % boys
Survey of examination of children with TS

1. Non-validated structured interview
   a. Diagnostic process of TS
   b. Treatment history, including pharmacological treatment
   c. Psychosocial consequences of TS
   d. Educational consequences of TS
   e. Short general medical history
   f. Family history, including genealogical trees

2. Assessment of co-morbidities
   a. OCD: CY-BOCS
   b. ADHD: DSM-IV criteria
   c. Rage attacks: Modified version of DSM-IV criteria for IED
   d. Symptoms of depression: CBCL
   e. Sleeping disturbances: CBCL
   f. Symptoms of SAD: non-validated systematic interview
   g. Stuttering: non-validated systematic interview

3. Assessment of severity of tics: YGTSS

4. Neuropsychological examination: WICS-III or WAIS-III

5. Socioeconomic status
Cohort

- Follow-up
  - 6 years after initial study
  - Same diagnostic instruments
  - DAWBA: psychiatric screening
  - Quality of life
  - History of abuse

Research project
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Tourette Syndrome

Tics:
- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)
Rage attacks
Tourette Syndrome
OCD
Stuttering
Sleeping disorders
Depressive symptoms
ADHD
ADD

Tics:
• Involuntary movements (motor tics)
• Involuntary sounds (vocal tics)
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Tics:
• Involuntary movements (motor tics)
• Involuntary sounds (vocal tics)

Attention Deficit (Hyperactivity) Disorder
- Concentration difficulties
- Hyperactivity
- Impulsivity

General population: 2-4 %
TS populations: 21-90 %
TS cohort: ADHD: 37.1 %
ADD: 13.5 %
Hyperactive-impulsive: 9.0 %

Tics:
- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)
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Obsessive Compulsive Disorder
- Obsessions: Bacteria and disease, death, fear that something will happen to others
- Compulsions: counting, rituals with symmetry and washing of hands, checking
- Causes distress, is time consuming, interferes with daily routine/social activities

General population: 1.1-1.8 %
TS populations: 11-80 %
TS cohort: OCD: 39.7 %
OCB: 6.7 %
Rage attacks
Tourette Syndrome
OCD
ADHD
ADD
Stuttering
Sleeping disorders
Depressive symptoms
Rage attacks

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Rage attacks
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OCD
ADHD
ADD
Stuttering
Sleeping disorders

Tics:
• Involuntary movements (motor tics)
• Involuntary sounds (vocal tics)

TS populations: 13-76 %
TS cohort:
Depression: 16.5 %
Symptoms of seasonal affective disorder: 39.2 %

Tics:
Rage attacks
Tourette Syndrome
OCD
ADHD
ADD
Stuttering
Sleeping disorders
Depressive symptoms
Rage attacks
Tics:
- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)
Tourette Syndrome

- ADHD
- ADD
- OCD
- Stuttering
- Rage attacks
- Sleeping disorders
- Depressive symptoms

Tics:
- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)
Rage attacks
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Tics:
• Involuntary movements (motor tics)
• Involuntary sounds (vocal tics)

Sleeping disorders

Nightmares
Somnambulism
Enuresis

TS populations: 12-62 %
TS cohort: 17.0 %
Rage attacks Tourette Syndrome OCD ADHD ADD Stuttering Sleeping disorders Depressive symptoms

Tics:
- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)
Tics:

- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)
Tics:

- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)

Tourette Syndrome:

- Failure to resist aggressive impulses
- Results in serious assaultive acts or destruction
- Out of proportion to any stressor

TS populations: 25-70 %
TS cohort: 50.8 %
Tourette Syndrome

Tics:
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Tourette Syndrome

Tics:
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Rage attacks Tourette Syndrome OCD ADHD ADD Stuttering Sleeping disorders Depressive symptoms

Tics:
- Involuntary movements (motor tics)
- Involuntary sounds (vocal tics)

TS populations: 8-31.3 %
TS cohort: 14.7 %
Difficult to distinguish vocal tics from stuttering
Wordmedial and wordfinal nonfluencies
Prevalence of co-morbidities

- Several other disorders associated with TS
  - Autism, Asperger syndrome
  - Epilepsy
  - Schizophrenia
  - Personality traits
  - Executive dysfunctions
  - Separation anxiety
- 10.2% without co-morbidity?
Prevalence studies

- Range of prevalences is high
- Clinical fluctuation symptoms
- Studies inhomogeneous
  - Age
  - Design
- Clinical vs. population-based study
Population-based studies

- Apter A et al. (1993)\(^1\)
- 28,037 individuals (16 to 17 years)
  - Screened for induction into the Israeli Defence Force
  - TS: 0.04 % (N=12)
    - ADHD: 8.3 % (3.9 % without TS)
      - Probably lower than in clinical samples because of relatively high age at time of examination
    - OCD: 41.7 % (3.4 % without TS)
Population-based studies

- Khalifa N et al. (2005-2006)\textsuperscript{2,3}
  - 4,479 children (7-15 years) in Sweden
  - TS: 0.6 % (N=25)
    - ADHD: 68 % (8 % without TS)
    - OCD: 16 % (0 % without TS)
      - OCD probably lower than in clinical populations because children were young at time of examination
Population-based longitudinal study

- Scharf JM et al. (2011)\textsuperscript{4}
  - 6,768 children in United Kingdom
  - TS: 0.3-3.2 %
    - OCD: 9-22 % (controls: 2%)
    - ADHD: 11-18 % (controls: 2%)
Population-based longitudinal study

- Scharf JM et al. (2011): population-based study showed
  - Co-morbid OCD less common than in clinical cohorts
  - Co-morbid ADHD less common than in other population-based studies
    - Due to used methods?
Population-based longitudinal study

- Scharf JM et al. (2011)
  - 8-9% of the TS cases had TS+OCD+ADHD
  - Nearly 70% did not have either of these two co-existing conditions
  - TS individuals in the general population may be more likely to have an isolated tic disorder without ADHD or OCD, compared with TS individuals in specialty clinics
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Severity of tics

Impact

- Total tic score
- Globale sværhedsgrad
Co-morbid ADHD

- Co-morbid ADHD associated with
  - OCD
  - Learning disorder
  - Conduct disorder
  - Negative impact on concurrent social, academic, and behavioural function, future quality of life, and global psychosocial functioning
Co-morbid OCD

- Co-morbid OCD associated with higher rates of:
  - Anxiety
  - Conduct disorders
  - Co-morbid ADHD
Co-morbid ADHD and OCD

- Co-morbid ADHD and OCD associated with
  - Coprophenomena
  - Impulsiveness/aggression
  - School refusal
  - Self-injurious behaviours
  - Clumsiness
Psychosocial consequences

Impact

- Is attending special education: p=0.001
- Has changed school: p<0.001
- Has been teased: p=0.005
- Experienced social restraints: p<0.001
- Experienced understanding in the neighborhood: p=0.026
- Felt lonely: p<0.001
- Experienced benefit in dealing with TS: p=0.002

Legend: TS-only, TS+co-morbidity
Neuropsychological consequences

- Co-morbid OCD
  - Associated with higher IQ
- Co-morbid ADHD
  - Lower performance IQ
  - ADHD related lowering of FSIQ
  - No difference between TS+ADHD and TS-only in neuropsychological tasks
Neuropsychological consequences

Cognitive profile

- Co-morbid ADHD: attention problems
- Co-morbid OCD: impaired performance on measures of achievement and executive function
- Co-morbid ADHD+OCD: difficulties in motor tasks and speed tasks
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Aetiology

- High prevalence of co-morbid disorders
- Correlations between tics and co-morbidities
- Close relationship between TS, OCD, and ADHD
Aetiological mechanisms

- Disorders of disinhibition
  - TS and OCD: disability to inhibit (in)voluntary repetitive behaviours
  - ADHD: failure to inhibit socially unacceptable behaviour, verbal responses, and impulsive actions
  - Failure to inhibit can be explained by fronto-striatal dysfunction
Aetiological mechanisms

- Genetic relationship
- Symptoms in pure OCD and pure ADHD can be different from the symptoms in TS+OCD and TS+ADHD, respectively
  - Distraction from tics and attempts to inhibit tics: attention difficulties
  - Psychosocial stress secondary to co-morbidities: might affect the presence of other co-morbidities (anxiety, mood disorder)
Aetiology

- TS and the co-morbid disorders are presumably neurotransmitter disorders.
- Professionals need to be aware of the close relationship between these disorders in order to:
  - diagnose the patients correctly
  - give the right treatment and support as soon as possible
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Presenting symptoms

Course

- Motor tics: 30.9%
- Vocal tics: 9.2%
- OCB: 5.1%
- ADHD: 4.8%
- Rage attacks: 2.9%
- Sleeping disturbance: 19.1%
- Stuttering: 19.7%
- Other (behavioural problems, anxiety): 8.3%
Age onset presenting symptoms

Course

Age of onset

- Sleeping disturbance
- ADHD
- Other (behavioural problems, anxiety)
- Rage attacks
- Stuttering
- OCB
- Motor tics
- Vocal tics
Course of ADHD

- Presenting symptoms: hyperactivity and impulsivity
- Hyperactive symptoms tend to improve during adolescence
- Inattention symptoms often persist in adulthood
Course of OCD

- Presenting symptoms: compulsions
- May arise any time
- Tend to have an onset around the time that the tics reach their worst-ever
- May also appear de novo in adulthood
Longitudinal studies

- Rizzo R et al. (2011): 10 years follow-up
- Pure TS at onset: almost half changed in TS+OCD
- 48% ADHD at onset: changed to pure TS (62%), TS+OCD (35%), and TS+ADHD+OCD (2%)
- 14% TS+ADHD+OCD at onset: 3% at follow-up
Longitudinal study in Denmark

- Preliminary data
- PhD project Camilla Groth Jakobsen, MD
- N=74
- Follow-up after 6 years
- Mean age ved T1: 12.4 years (5.5-18.75)
Severity of tics

Preliminary data

- Total motor tic: \( p < 0.005 \)
- Total vocal tic: \( p = 0.008 \)
- Total tic: \( p < 0.005 \)
- Global severity: \( p = 0.089 \)
ADHD and OCD

Preliminary data

Course

ADHD

OCD

p=0.019

p=0.007

T1

T2
OCD severity
Preliminary data

Course

Score obsessions
Score compulsions
Total OCD

p=0.229
p=0.186
p=0.123
Course

- Pure TS at onset: a quite good long-term clinical course
- Co-morbid condition at onset: a severe prognosis
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ADHD

- Behavioural interventions
- If insufficient, pharmacological treatment should be considered
- European guidelines: stimulants, atomoxetine, or clonidine. May be combined with an (antipsychotic) agent for tics
OCD

- European guidelines: risperidone
- May be combined with a serotonin reuptake inhibitor or behavioural treatment
Other comorbidities

- Rage attacks: risperidone
- Sleeping disturbances: clonidine or melatonin
- Co-morbid depression: tricyclic antidepressants and serotonin reuptake inhibitors
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Conclusion

- TS is often associated with co-morbid disorders, like ADHD and OCD.
- The presence of these co-morbidities has an impact on psychosocial, educational, neuropsychological consequences of TS.
- Co-morbidities are associated with a higher rate of other co-morbid disorders, like rage, anxiety, and conduct disorders.
- The exact aetiology is not known, but they probably all are neurotransmitter disorders.
- Professionals need to be aware of the close relationship between TS and co-morbidities in order to give the patients the right treatment and support.